The TOOL ENGINEER

MACHINERY PRODUCTION TOOLS

n National Defense production motions are minutes. New ritain Automatics save both; for they stop automatically — n loading position — when stock is exhausted in any spindle. collet open-tool slides withdrawn — feed disengaged — ock stop in place — New Britain Automatics come to a halt — ready for action. *New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Conn.*

MODEL 86

NEW BRITAIN AUTOMATICS

Stay on the Job

A complete line of Chuckers . . . 4, 6 and 8 Spindles up to 10¼" Capacity
Also a complete line of Multiple Spindle Screw Machines up to 4¼" Capacity

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The Kellerflex JB-1 machine, shown here, has a ¼ H.P. totally enclosed motor with an overload switch. Speeds available for this model range from 875 to 6800 R.P.M.

RIGID quality has reaped its reward . . . defense industries have found that they can depend on the trouble-free operation of Kellerflex machines and equipment. Their power and flexibility can be used constantly . . . 24 hours a day—every day.

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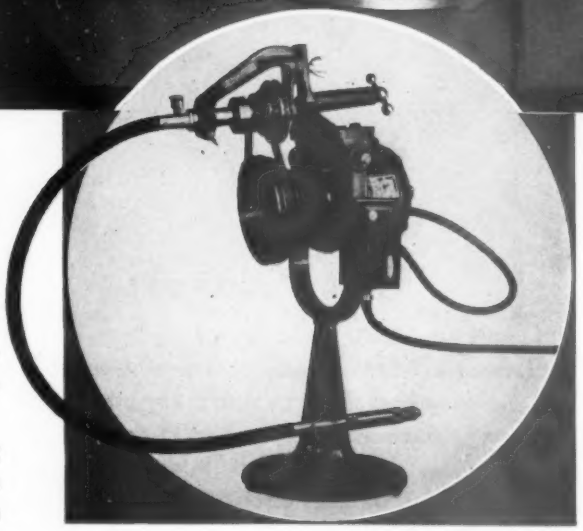

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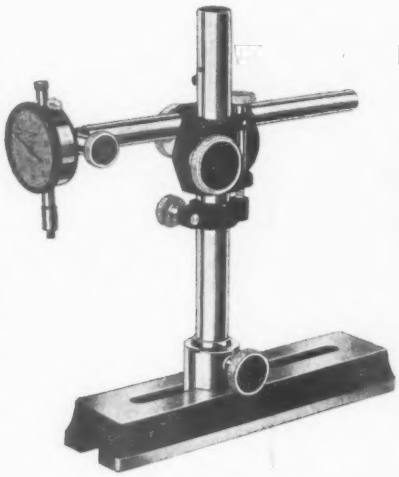

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The pilots rely on the precision of their navigating instruments and engine controls in front of them.

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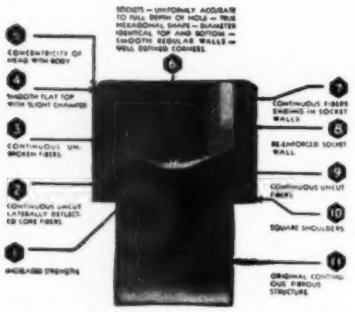
GUARANTEED Unfailing PERFORMANCE



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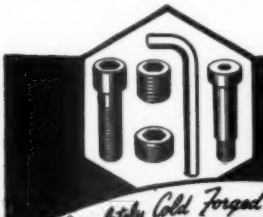

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THE HOLO-KROME SCREW CORP. HARTFORD, CONN., U. S. A.

THE TOOL ENGINEER

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TORQUE TUBE FLANGES

Broaching is now used for enlarging and smoothing the holes in the discs used for making the flanges for torque tubes in the Buick automobile plant. The collar is then extruded on the flange by the unusual extruding process which is described on page 68 in this issue.

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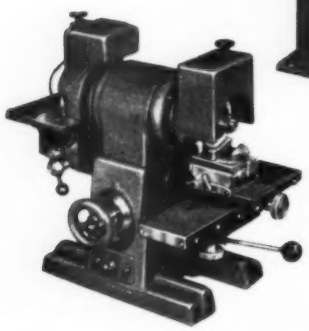
First requirement of a Carbide Tool Grinder is accuracy. The HAMMOND "6" (right) gives it to you with adjustable work tables (removable by loosening one simple clamp) that can be accurately adjusted . . . point by point . . . from 0 to 20°. And the "6" motor . . . ½ HP . . . is plenty powerful for any load put on it's 6" wheel. Furnished with plain guards for dry grinding . . . integral guard and coolant tank for wet grinding with diamond wheel. Bench model or floor model (as shown). Get full details now!



Hammond "4" Chip Breaker Grinder

Get rid of that sharp, cluttering "hay" that spirals from cutting tools. Break it up with HAMMOND'S new CHIP BREAKER GRINDER that grooves Carbide Tools on any angle to hair-line precision. For information, just check the space below.

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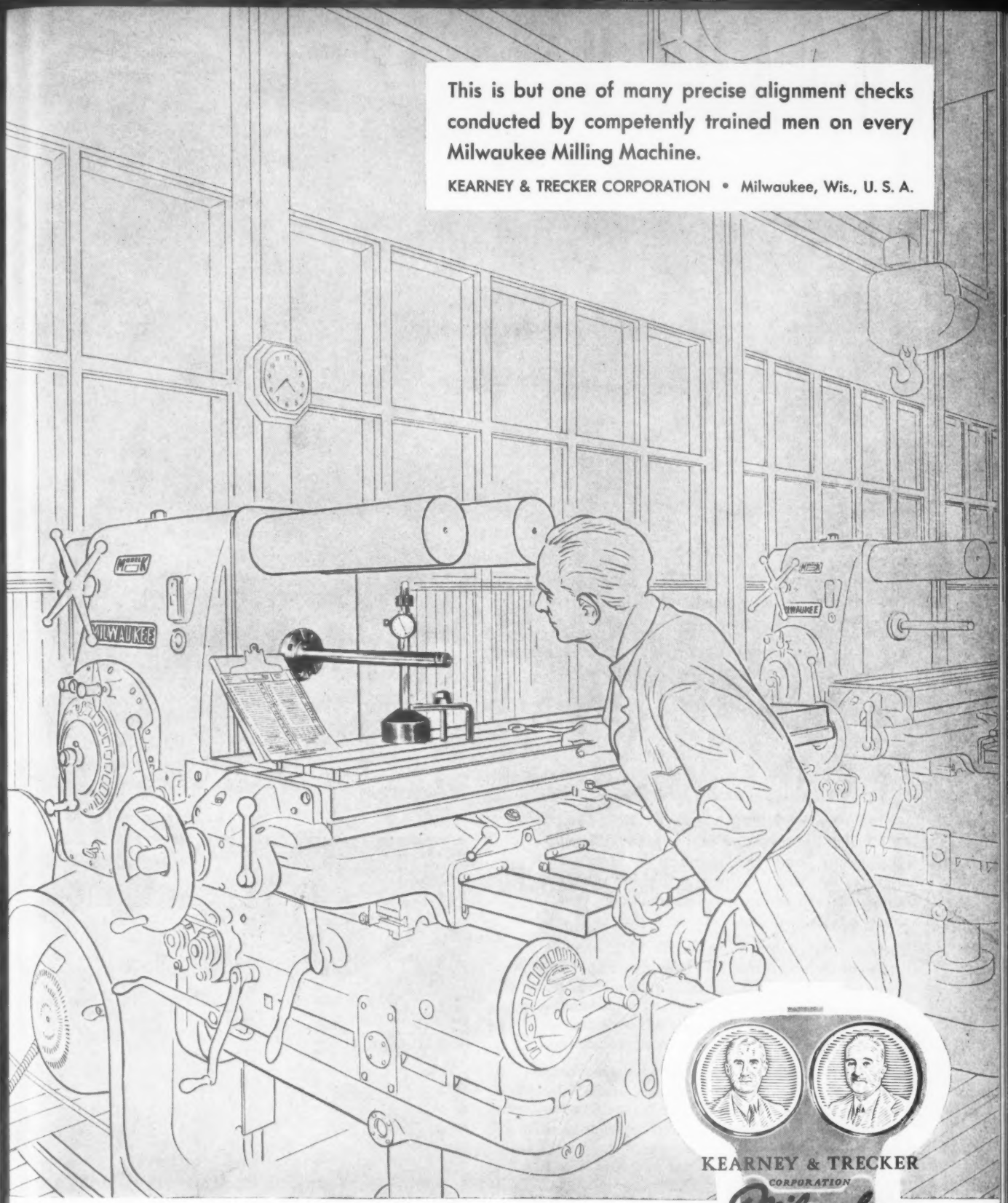

This is but one of many precise alignment checks conducted by competently trained men on every Milwaukee Milling Machine.

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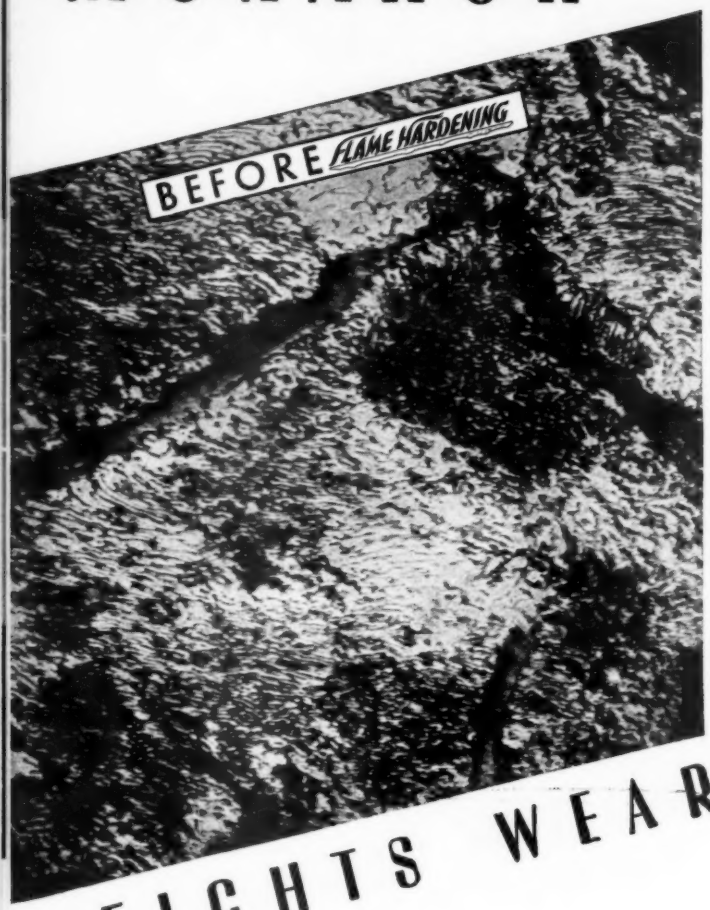
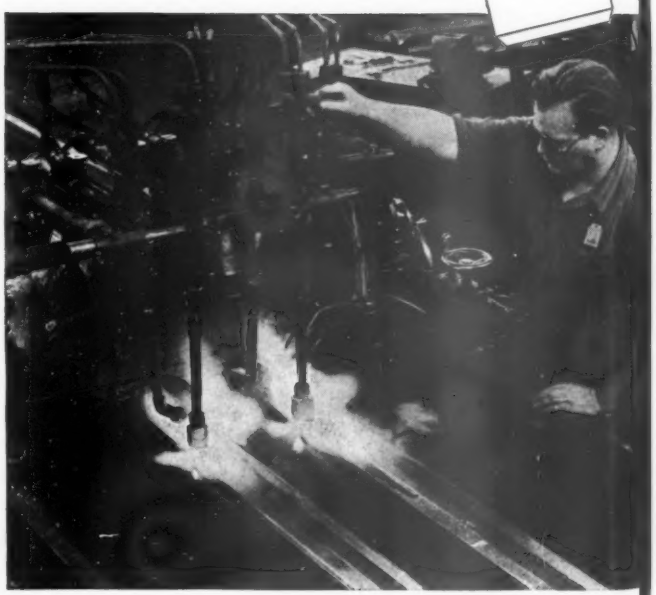


FIGHTS WEAR WITH FLAME

TO the layman there is no great difference between these two photographs, but your metallurgist will instantly recognize the vast improvement in grain structure in the photo shown above at right.

These microphotographs, made at 500x, show a section of the way surface of a Monarch Lathe bed, before and after FLAME HARDENING. This exclusive Monarch process is used on the bed way surfaces of all Monarch Lathes. The result is a surface so hard as to practically eliminate wear and scoring.

That's why Monarch bed ways retain their original accuracy throughout the life of the lathe. And that's why far-sighted Defense contractors . . . with future peacetime production in mind . . . are installing these long-life Monarch lathes in their production lines. The Monarch Machine Tool Company, Sidney, O.



LET'S GO! U.S.A. KEEP 'EM FLYING!

MONARCH LATHES

Here's the AIR way
to make
PRODUCTION FLY!
With the New 3-lb. Rotor Air Grinder

FOR SPEED AND STAMINA. A few of the 156 Rotor Air Grinders purchased by a large airplane engine manufacturer to speed up Defense production of cylinder heads. They're built to stand the gaff of 24-hour-per-day service. Weigh only 3 lbs. Run at 21,000 R.P.M.

Needed a sturdy, light-weight tool. A large aircraft engine manufacturer required high-speed grinders to clean up aluminum cylinder heads. Had to get in between cooling fins with special ¼" reamers, 2½" long. Air supply was ample. They needed a light-weight tool—one that could "take it" 24 hours a day—for SPEEDY DEFENSE PRODUCTION.

It was a "natural" for the Rotor Die Grinder—an AIR tool. This magnesium-built grinder weighs only 3 lbs. You can move it around all day long—faster—with less fatigue. And, as for its ability to *stay on the job*—just try it! This engine manufacturer compared it to others . . . ordered 156 of them!

Now—they're really *cleaning up* cylinder head production schedules with these speedy, sturdy Rotors.

Air or High-Cycle? Study of *your* portable tool problems may show how to "buy time" for rush Defense work—to get *faster output* and *lower costs.* Call me in. No obligation. Remember, I can recommend either Air or High-Cycle—whichever best meets *your* needs—I'm unbiased.

The Rotor Analyst has 65 different Air tools and 59 different High-Cycle tools with which to solve your grinding, sanding, drilling, etc. problems.

THE ROTOR ANALYST

THE ROTOR TOOL CO.
CLEVELAND, OHIO

MORE AND MORE *Production*
"ON THE WAY"
With Microfinished Precision

Stock removal, **up to .060" or .075" at rates as high as 65 cubic inches per hour, to generate correct size, straightness and roundness, is the dominant feature of Micromatic Honing. The Micromatic Honing Process (available with Automatic Microsize for bores up to 2" in diameter and 6" long) will generate uniform size within .0002" to .0005"—bore accuracy within .0001" to .0002"—removing sufficient stock to get the desired results. Applications to ordnance have included gun tube honing, before and after rifling —gun case honing—internal honing of recoil cylinders—external honing of recoil pistons—reconditioning in placement of worn gun tubes up to 16" caliber.**

Typical gun barrels regularly honed in production by Micromatic equipment include 50 caliber machine guns—20 millimeter cannon, 37 millimeter cannon, as well as other and larger calibers up to and including 16" and 18" and from 30" up to 75 feet in length.

★

External honing of recoil piston rods generates accuracy within .0001" to .0003" and any desirable finish.

★

Recoil cylinders Micromatic honed. Circular illustration—looking down the bore. The regularity of the eccentric rings (a phenomenon of smooth surface finish) evidences round and straight accuracy generated in typical ordnance applications within .0005" to .0007" as measured with both star and electric gauges.

★

Typical of tooling used for honing large caliber guns is this hydraulically actuated tool. This tool was designed for bores 18" in diameter, 62 feet long.

Automatic Honing with Automatic **MICR·O·SIZE**

GUNS! GUNS! GUNS!

Hones used by a foreign government for honing tubes and casings of 3.7" anti-aircraft guns.

MICROMATIC HONE CORPORATION

1345 E. MILWAUKEE AVE. DETROIT, MICHIGAN

An Apology and a Promise

to all users of

Davis Boring Tools

First of all, this message is an earnest, sincere apology to our many customers, who haven't been getting the kind of service from us recently that they are entitled to.

The reason is, of course, obvious. Defense orders had to have the right of way—and there was a multitude of them coming to us all at once and literally swamping our facilities.

Now, however, our production has caught up with things once again. As fast as was humanly possible, we have added more space, more machines, more skilled tool engineers. The result is that we are now geared up to really do a better job for you than ever before.

So please do not hesitate to send us your orders, you hundreds of loyal customers who need dependable Davis Boring Tools. Send them now. We assure you that we will take care of all your requirements efficiently and *promptly*—that we will deliver on the date promised—and once again warrant the warm praise you have always had for our product, our organization, and our service.

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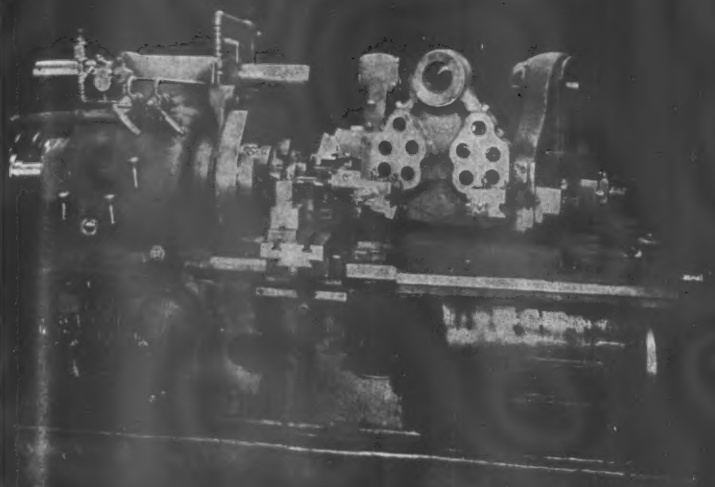
Larkin Packer Co., Inc., St. Louis, U. S. A.



23 TRACTOR PARTS *in* 51 MINUTES

An example of high Production with simple tooling on the . . . .

P&J 5·D TWO SPINDLE POWERFLEX

THE JOB AND HOW IT IS HANDLED

Part: Tractor Track Roller Shaft Bracket
Material: Malleable Iron
Machining Time: One operation only—Two subjects 3.91 minutes
Floor to Floor Time: 4.21 minutes
Production: 23 Brackets per 51 minute hour
Operation: Cross slide operates simultaneously with the tools mounted on turret allowing rough and finish facing cuts to be taken without loss of time. It also provides an operating mechanism for auxiliary slide tool mounted on turret face. Tools mounted on the auxiliary slide tool are used for machining of angular recess groove.

Machining Operations:

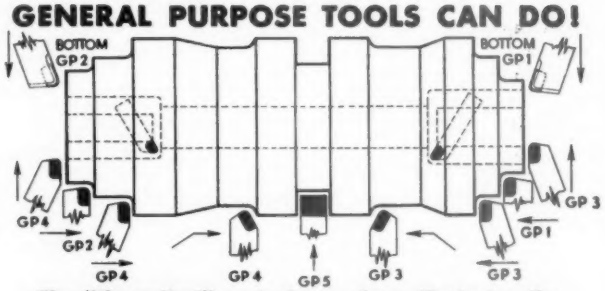
1st T.F.: Rough bore hole; bore and face 3⅝" dia. turn O.D.
2nd T.F.: Rough face end; rough machine groove for belt oil seal
3rd T.F.: Finish bore hole; bore and face 3⅝" face end
4th T.F.: Finish machine groove
5th T.F.: Ream hole

The POTTER & JOHNSTON MACHINE CO.

FIRTHITE *GENERAL PURPOSE* TOOLS are *now* available *from stock* for *immediate shipment!* They are made in 5 carefully designed styles, 10 sizes, and 4 grades of Firthite Sintered Carbide tips . . . complete, ready-for-use, including ground-in chip breaking groove on tools for steel cutting. These tools are instantly applicable to fully 80% of the needs of the average shop. Further, they can be quickly modified, by simple grinding, for applications that require special shapes. Before ordering refer to your copy of FIRTHITE GENERAL PURPOSE TOOL List for styles, sizes, grades and prices, or write if you do not have one.

SEE WHAT FIRTHITE

GENERAL PURPOSE TOOLS CAN DO!



The "theoretical" part shown above illustrates the broad adaptability of FIRTHITE GENERAL PURPOSE TOOLS. It shows a few of the many jobs that these standardized tools can do faster, better and cheaper.

FIRTH-STERLING
STEEL COMPANY

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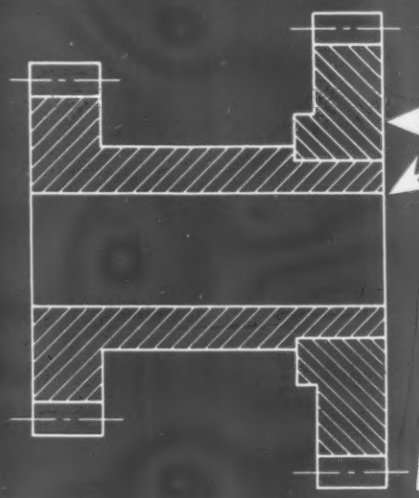
Sunnen Honing Solves Another Problem!



PROBLEM . . .

A leading manufacturer of machine tools was faced with the problem of hole closing in when gear was pressed on, causing taper of .001" to .0015". Production set up, indicating and grinding out taper required 30 minutes per gear.

SUNNEN SOLUTION

Gear hub is now honed on Sunnen Precision Honing Machine—and since it requires no set up or locating time—it handles this job in 3 minutes—an increase in production of 1,000%.

SUNNEN *Precision* HONING MACHINE

Low in Cost . . . Easy to Use

For holes .185" to 2.400".

Accuracy within .0001" guaranteed.

Machine can be set up and work located ready for honing in less than one minute.

Facilitates accurate duplication of sizes.

This is just one example of hundreds of problems being solved by Sunnen Honing.

If you have a job requiring the sizing or finishing of internal cylindrical surfaces from .185" to 2.400" with super-smooth finish and within precision limits, the Sunnen Precision Honing Machine will

SOLVE FIVE IMPORTANT PROBLEMS

1. Corrects errors of out-of-roundness and taper produced by previous operations
2. Produces super-smooth surface finishes
3. Finishes holes to close tolerances both as to size and straightness
4. Maintains alignment established by previous operation
5. Provides simple, low cost production method of duplicating sizes accurately.

DOES NOT REQUIRE SKILLED LABOR

Any intelligent workman with a few hours practice can produce super-smooth finishes and hold accuracy within .0001".

WRITE FOR 8-PAGE BULLETIN — or if you prefer a sales engineer will be glad to call and demonstrate in your plant on your job just what this machine can do for you.

SUNNEN PRODUCTS COMPANY
7932 Manchester Avenue, St. Louis, Missouri
Canadian Factory: Chatham, Ontario

SUNNEN

"A perfectly straight round hole with a mirror finish."

Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 inch."

Drawing and Blanking Die "Saves time in producing smooth base metal finish."

Inner Bearing Ring "Accurately removes last 'tenth' of stock."

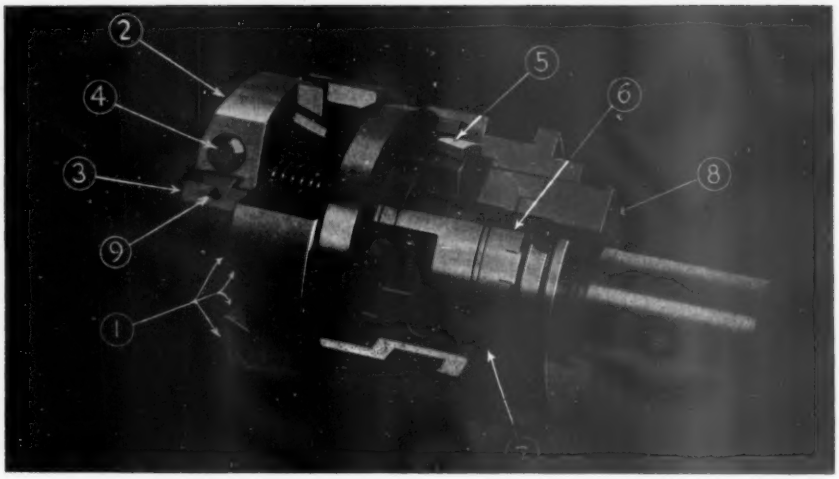
"Strict alignment maintained between two holes."

Rubber Eraser Extrusion Die "Tripled life of extrusion dies."

Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.

"Produced an extremely accurate and glass-like finish."

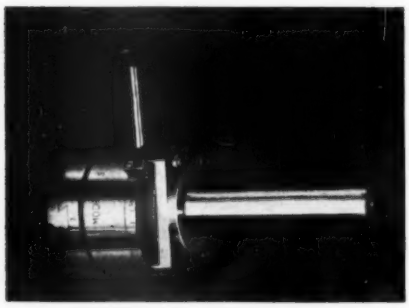
9 Reasons why



JONES & LAMSON SELF-OPENING DIES PRODUCE SCREW THREADS FASTER AND MORE ACCURATELY

Above: Jones & Lamson Tangent Revolving Self-opening Die Head.

Below: Jones & Lamson Tangent Stationary Self-opening Die Head.



1. Jones & Lamson Tangent Dies are hardened and ground throughout. The die body is not only ground — it is lapped on the face and in the dovetail slots.
2. Jones & Lamson Universal Chaser Holders are accurate fitting, have widespread bearing with minimum overhang and furnish utmost rigidity to the chasers. Only one set of these Holders is required for any right-hand thread within the rated die capacity, regardless of diameter or pitch. This eliminates the need of numerous sets of Holders and the resulting expense and annoyance.
3. Chasers extend beyond face of Holders, permitting close-to-shoulder threading throughout the life of the chasers.
4. A single screw secures, or releases, the chaser.
5. The locking ring provides four locking surfaces for longer die life. This ring is solidly supported by the Drive Ring and the Adjusting Nut.
6. The adjusting thread is ground for accurate size adjustment.
7. Widespread calibration permits accurate size adjustment.
8. Adjusting nut for controlling pitch diameter. Backing off this nut two or three turns permits removal of Chaser Holders.
9. Jones & Lamson Tangent Chasers are ground in the thread, can be resharpened many times and the original accuracy is maintained after each resharpening.

All Jones & Lamson Tangent Ground Thread Chasers are guaranteed to produce threads to Class 3 Fit, American National Standards. Write today for complete, illustrated Tangent Dies booklet.

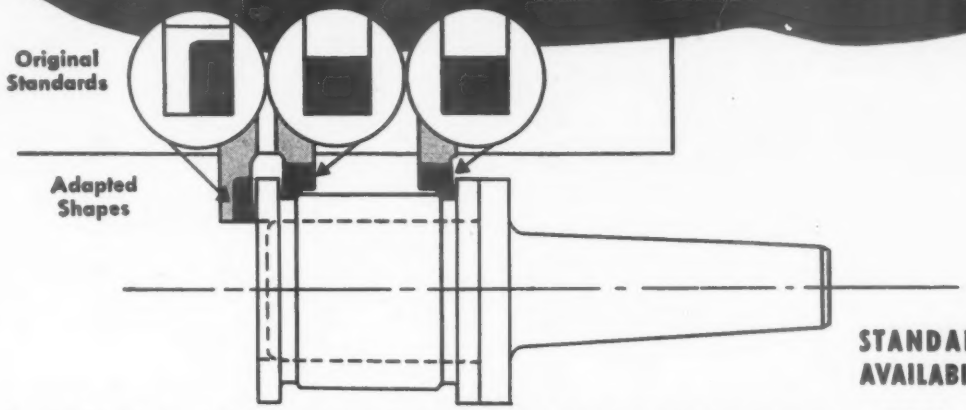
JONES & LAMSON MACHINE COMPANY

Springfield, Vermont, U. S. A.

Manufacturers of: Saddle & Ram Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Tangent and Radial, Stationary and Revolving Dies and Chasers.

PROFIT PRODUCING MACHINE TOOLS

FEDERAL-MOGUL
Saves 6 to 8 Weeks on
CARBIDE TOOL DELIVERIES!



QUICKLY ADAPTS CARBOLOY STANDARD TOOLS TO FORM CUTTING . . .

To eliminate weeks of waiting for special form tools required to machine their bushings and bearings, Federal-Mogul Corporation—well known Detroit manufacturers, evolved this simple, fast method:

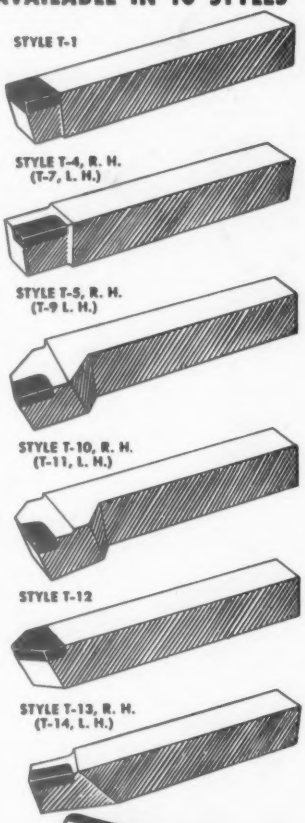
Instead of ordering form tools, Federal-Mogul Corp. orders Carboloy STANDARD-STOCK tools and quickly adapts them to meet their special requirements.

The example illustrated above is typical. The tool at left is adapted from a Carboloy Standard Style 4. Federal-Mogul orders this tool from stock and grinds the slight offset required. The two tools at right are adapted from Carboloy Standard Style 1. Federal-Mogul orders these from stock and grinds the ends to the form shown. All adaptations are made in the Federal-Mogul tool room.

In setting up this "help yourself" plan, Federal-Mogul last Fall checked all of their form tool drawings against Carboloy standard tool specifications. All standard tools that could be readily adapted to their special form requirements were so identified. Standard tools were then stocked and made immediately available for current demands.

Through this simple procedure form tools get on the job FAST—at Federal-Mogul. May we help you get the same fast results? Send for Catalog GT-129.

STANDARD TOOLS ARE AVAILABLE IN 10 STYLES



CARBOLOY COMPANY, INC., 11145 E. 8 MILE BLVD., DETROIT, MICH.

Chicago • Cleveland • Los Angeles • Newark • Philadelphia • Pittsburgh • Worcester, Mass.

Canadian Distributor: Canadian General Electric Co., Ltd., Toronto, Canada

CARBOLOY STANDARD TOOLS & TIPS

"You ALWAYS Get Standards FASTER Than 'Specials'"

CATALOG GT-129

SEND FOR FREE CATALOG

FOR "Tops" in Production

Use Hanna Squeeze RIVETERS

"They set more rivets per hour-per man"!

• Hanna Pneumatic Yoke Riveter. A compact, light weight portable riveter for driving $\frac{3}{16}$", $\frac{1}{4}$", $\frac{5}{16}$" and $\frac{3}{8}$" rivets cold.

• Hanna Portable Alligator Riveter. Developed for driving rivets in assemblies where clearance conditions are restricted.

• Adaptation of Hanna Pneumatic Riveter to multiple riveting of gear assemblies.

• Hanna Hydraulic Ring Gear Riveter tooled for multiple riveting.

• 12" Reach 12" Gap Hanna Portable Pneumatic Riveter. Available in 20, 30, 50 and 80 Tons Pressure.

• Shepard Portable Pinch Bug Riveter. Drives rivets from below. Particularly adapted for structural steel fabricating shops.

• 75" Reach 24" Gap Hanna Stationary Pneumatic Riveter. Available in pressures of from 20 to 150 Tons.

• Hanna Rapid Riveter with removable stake. Available in 6, 10, 15 and 20 Tons pressure for driving $\frac{3}{16}$" to $\frac{3}{8}$" diameter rivets cold.

TODAY, when every motion and moment saved is important, Hanna Squeeze Riveters are helping industry reach and maintain peak production. In defense work, both direct and indirect, they are squeezing rivets fast and tight in many plants on many types of work. Here is one reason why:

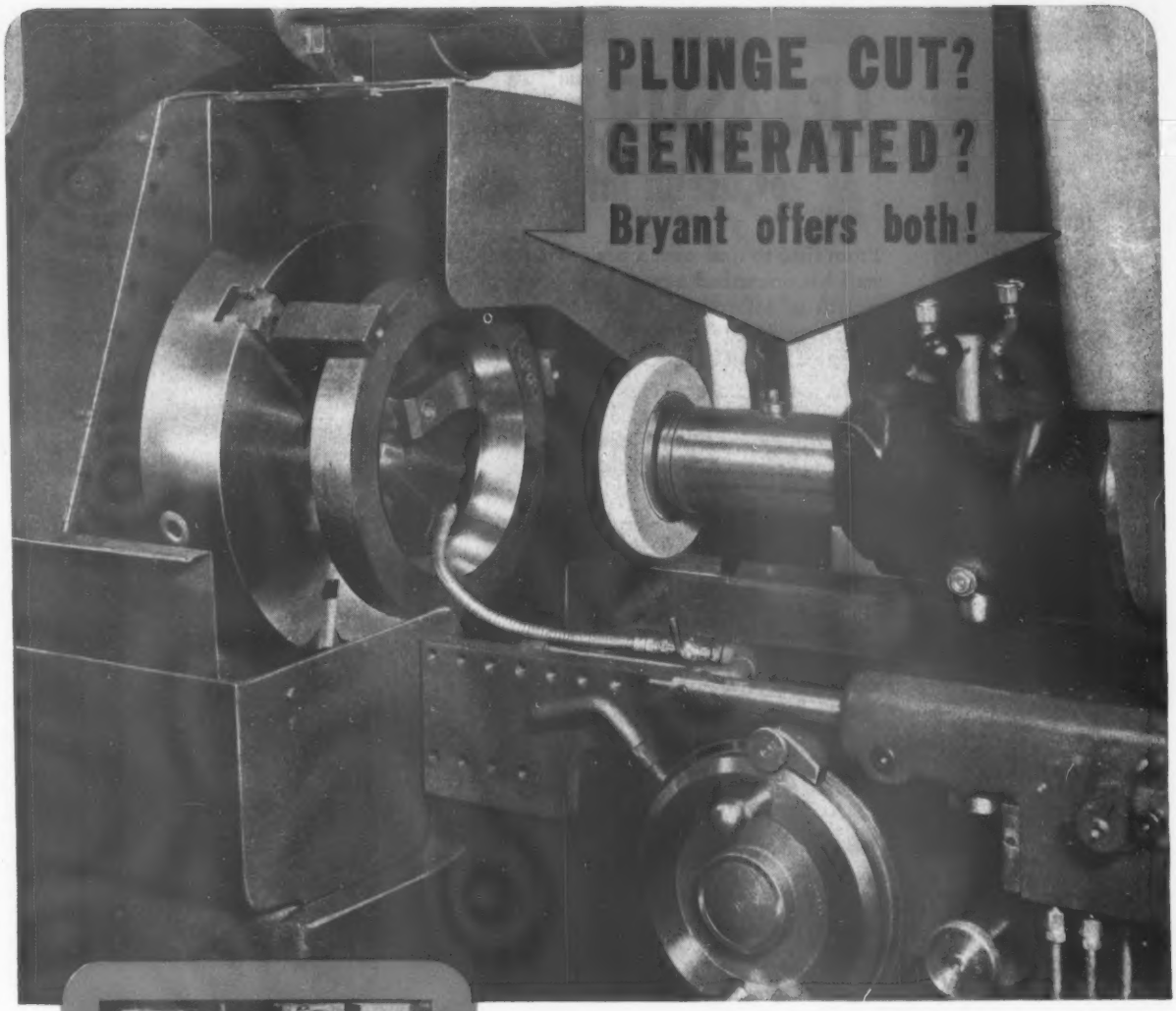
• Hanna Squeeze Riveters drive a rivet with each stroke of the piston. The full rated tonnage is exerted throughout the last portion of the die stroke—its squeezing action causes the metal in the rivet shank to flow, completely filling the rivet hole, assuring positive tightness.

If you rivet why not write for recommendations, sending a sample or description of your work.

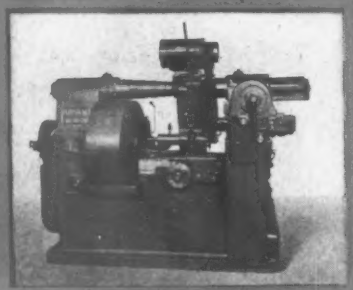
OVER 700 STYLES AND SIZES TO *squeeze your rivets* HOT or COLD!

HANNA ENGINEERING WORKS
1772 ELSTON AVENUE • CHICAGO, ILLINOIS

Air and Hydraulic RIVETERS
Air and Hydraulic CYLINDERS
Air HOISTS



View showing formed guide attached to wheel slide arm on No. 16 Bryant Grinder



No. 16-28" Bryant Internal Grinder

THE Bryant principle of overhead wheel slide suspension lends itself to the easy, profitable grinding of dies and similar parts.

A guide is used for controlling the wheel slide traverse to follow the work contour or for controlling the shape of the wheel if the plunge cut method of grinding is preferred.

The first, or generating, method has been favored by many manufacturers of dies due to assurance of smooth blended curves and freedom from rings left by the abrasives.

The plunge cut method is much the faster method due to the larger area of contact of the grinding wheel.

Which method will best suit your requirements? Our engineers and field men will gladly help in solving your problems.

BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VERMONT, U. S. A.

A TREASURE CHEST

of useful information...

From time to time over a period of years our technical staff has unearthed new facts concerning metals. This wealth of information has been accumulated out of wide experience in the solution of problems involving the use of Nickel and its alloys.

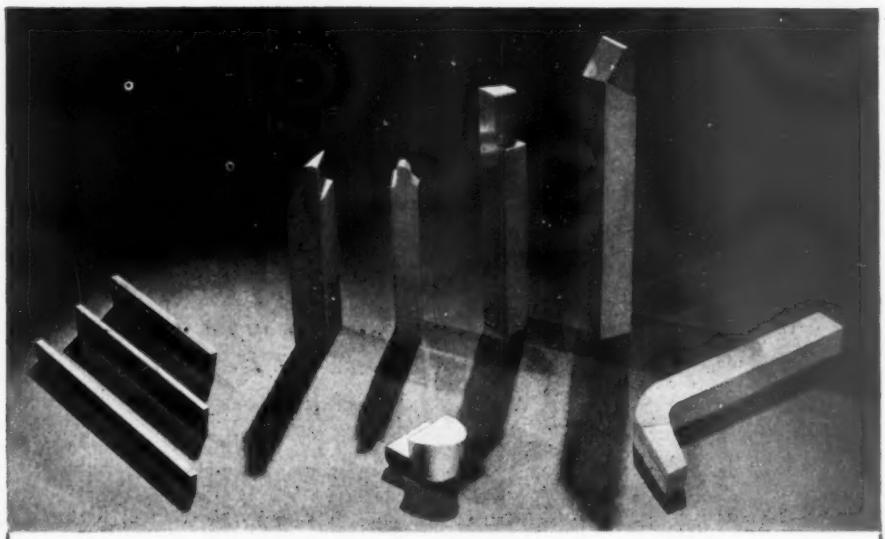
On the basis of this experience much helpful literature has been compiled. Dealing with the selection, fabrication and use of Nickel alloys it can be of great help to the metal working industries at a time like the present.

In addition to printed matter, we are glad to make available the assistance of our technical staff in solving problems arising from a temporary lack of Nickel. Your request for literature or personal consultation will receive our prompt attention.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

● Through years of engineering and manufacturing development, National Cutting Tools have qualified to meet the challenge of the day.
They typify the strength and stalwartness of the American workingman and of the American metalworking industry.
NATIONAL
NATIONAL TWIST DRILL & TOOL
DETROIT U.S.A.

HAYNES STELLITE TOOLS For High Production at Low Cost per Piece Machined



Tools Available on Order

Shown above are a few typical Haynes Stellite turning and grooving tools, a welded tip tool, and a tool tip. Tools for practically every machining operation are regularly supplied, cast and finish ground to users' specifications. These include milling cutter and reamer blades, brazed-in blade shell end mills, spot facers, counterbores, reamers, and a variety of form tools. Details upon request.

Take full advantage of the high cutting quality of the many available forms of Haynes Stellite cutting tools. These uniform, dependable tools increase production and at the same time assure low cost per piece machined. Haynes Stellite alloy tools are efficiently and economically used for machining practically all machinable materials except chilled cast iron and manganese steel.

Standard Tools for Immediate Delivery

Standard Haynes Stellite tool bits are available in a variety of sizes—both flat and square—ready for immediate delivery. These bits are supplied finish ground ready for use in standard tool holders. They will help you reduce your tool inventory because they can be easily converted to the special profiles required for various operations.

For jobs on which the use of solid bits is not practicable, you can obtain immediate delivery on standard welded tip tools in a wide variety of sizes and shapes.

Write or phone the district office nearest you for complete information on standard and special Haynes Stellite tools.

HAYNES STELLITE TRADE MARK

Red-hard, wear-resisting alloys of cobalt, chromium and tungsten

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York, N. Y. UCC Kokomo, Indiana

Chicago—Cleveland—Detroit—Houston—Los Angeles—San Francisco—Tulsa

• HIGH-PRODUCTION METAL-CUTTING TOOLS •

"Haynes Stellite" is a registered trade-mark of Haynes Stellite Company

Here is ACCURACY for Your Spline Milling!

These BARBER-COLMAN Spline Cutters Mill 229 Lineal Inches of Spline An Hour—

A pair of specially designed B-C Spline Milling Cutters solved this highly accurate milling problem for a machine tool builder.

Tough steel drive shafts are splined on a Milwaukee Duplex Mill using two indexing fixtures; roughing in one fixture and finishing in the other. This set-up produces a finished shaft every 33 minutes; milling 6 splines 21" long; holding key width within 0.002" and the root diameter within 0.0009". Cutters are sharpened frequently, which promotes highest accuracy and results in longer cutter life. The roughing cutter nets 25 shafts per grind; the finishing cutter, 40 shafts.

You, too, can have this precision milling on splines or any other work with B-C Cutters. Try them on your next job.

● B-C Spline Cutters are form-relieved, which maintains the correct form throughout the entire life of the cutter. Resharpening by grinding the faces of the teeth does not destroy their shape or form.

Barber-Colman makes special cutters for practically every requirement; and experienced B-C Cutter Engineers will gladly cooperate in solving cutter problems, without obligation. Also a wide selection of B-C standard cutters are available for prompt delivery, including "Paraform" plain or helical mills. Use B-C Complete Cutter Service for peak milling results.

HERE'S THE SET-UP

Cutters — Two Ground B-C Spline Milling Cutters; 2¾" dia.

Part — 6-Spline drive shaft; Hy-Ten B 3x steel; 50-55 Scleroscope hardness.

Milling Machine — Milwaukee Duplex Mill.

Operation — Mill 6 splines 0.074" deep x 0.272" wide x 21" long on each shaft; rough milling in right fixture and finishing in left; climb cut. Finish cut removes 0.010".

Holding — Two indexing fixtures; each with 3-jaw chuck, and independent guides supporting length of shaft. Load through hole in index head.

Feed — Rough and finish, 4.2" per min.

Speed — Rough, 87 r.p.m. — Finish, 131 r.p.m.

Production — Duplex set-up nets a complete 6-spline shaft in approx. 33 minutes floor-to-floor.

Accuracy — Hold finish dimensions of 0.9546-0.9537" on root dia., and 0.274"-0.272" on key width.

Pieces Per Grind — Rough, 25 — Finish, 40. This relatively frequent sharpening holds highest accuracy; adds to cutter life by preventing excessive wear on cutting edges.

BARBER B-C COLMAN

PRODUCTS

HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

Barber-Colman Company

General Offices and Plant 213 Loomis St., Rockford, Illinois, U. S. A.

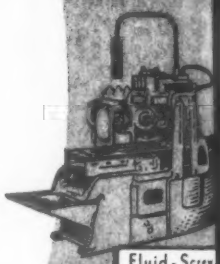
Engineered Productio

STEEL
Straddle mill; at 25 revolutions per minute and 52 surface feet a minute.
CAST IRON
Mill face, and straddle mill lugs; at 104 r.p.m. and 100 surface feet a minute.
ALUMINUM
Slab mill base and straddle mill sides; at 1200 r.p.m and 1180 surface feet a minute.

No. 00 Rigidmil

No. 0 Rigidmil

No. 1 Rigidmil


Fluid-Screw Rigidmil

Bulletin Tells How

Bulletin 383 tells all about No. 1 Rigidmil and how it can serve you most effectively. Write for your copy today.

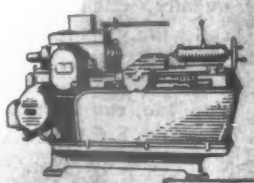
Rigidmil Handles All 3 Effectively

Can you run all three of the widely different jobs indicated above on any one of your millers? You can on a Sundstrand Number 1 Rigidmil . . . and get high production, accuracy and fine finish on every one.

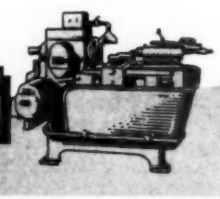
Unique design of Rigidmil spindle-head has 60 to 1 ratio, gives 74 possible speed changes. Sundstrand Hydraulic Equipment provides a complete range of stepless feeds, climb cutting and conventional milling, semi-automatic or continuous operating cycles accurately controlled by easily adjusted dogs.

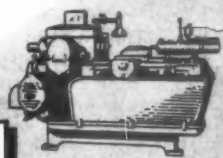
Highly accurate, extremely durable, Number 1 Rigidmil has ample power, strength and rigidity to carry its highest speeds and heaviest feeds. Easy to set up and change over, it has amazing flexibility of application which enables you to engineer production most effectively on a remarkably wide variety of milling operations and metals.

Smaller and larger Rigidmils also provide the advantages indicated above. Investigate Rigidmils for your future milling requirements, Automatic Stub Lathes for your turning. Use Sundstrand Engineered Production to get maximum output most easily and economically on both types of machining.


Model 12 Automatic Stub Lathe

Sundstrand Machine Tool Co.
2532 Eleventh Street, Rockford, Illinois, U. S. A.


Model 8 Automatic Stub Lathe


Model 10 Automatic Stub Lathe

In their respective fields, Sundstrand machine tools are unexcelled for high production, accuracy, and lasting value. Write for complete details.

RIGIDMILS · STUB LATHES

Hydraulic Operating Equipment — Drilling and Centering Machines

TANTUNG "G"

PATENTED

The Miracle Cutting Tool Metal

INCREASES PRODUCTION ON OLD OR NEW MACHINES

- PROMPT DELIVERY on all Standard Sizes
- MACHINE ALL METALS including Tough Steel
- MUCH LONGER RUNS between Tool Grinds
- EASY GRINDING TECHNIQUE
- NO CHANGE-OVER TROUBLE — Simply install the tool, increase the speed and start work
- INCREASED PRODUCTION from the same men and machines
- SERVICED and ENGINEERED by the makers of VASCOLOY-RAMET
- ECONOMY TOOLS — All Purpose Tools, Solid Tool Bits, Milling Cutter Blades

■ Tantung "G" is not steel, not cemented carbide, but a miracle metal that combines many advantages of both:

HARDNESS for Long Production Runs... red hardness for higher than that of any steel permits longer runs at *double* the usual cutting speeds on most jobs.

STRENGTH for Shock and Vibration... unequalled on interrupted cuts, on scale and hard spots, and on older machines. Especially recommended for "borderline" jobs where carbide tools are hazardous, and steel or other alloy tools require constant grinding.

TANTALUM to Resist Chip Wear... Tantung "G" contains Tantalum Carbide, previously used only in the best cemented carbides. It reduces chip wear and enables these tools to cut the toughest, stringiest steel.

Tantung "G" Tools are setting records that everybody is talking about. Put these miracle tools to work in your shop today. Call the nearest Vascoloy-Ramet Factory Branch and get prompt delivery of stock sizes.

VASCOLOY-RAMET CORPORATION

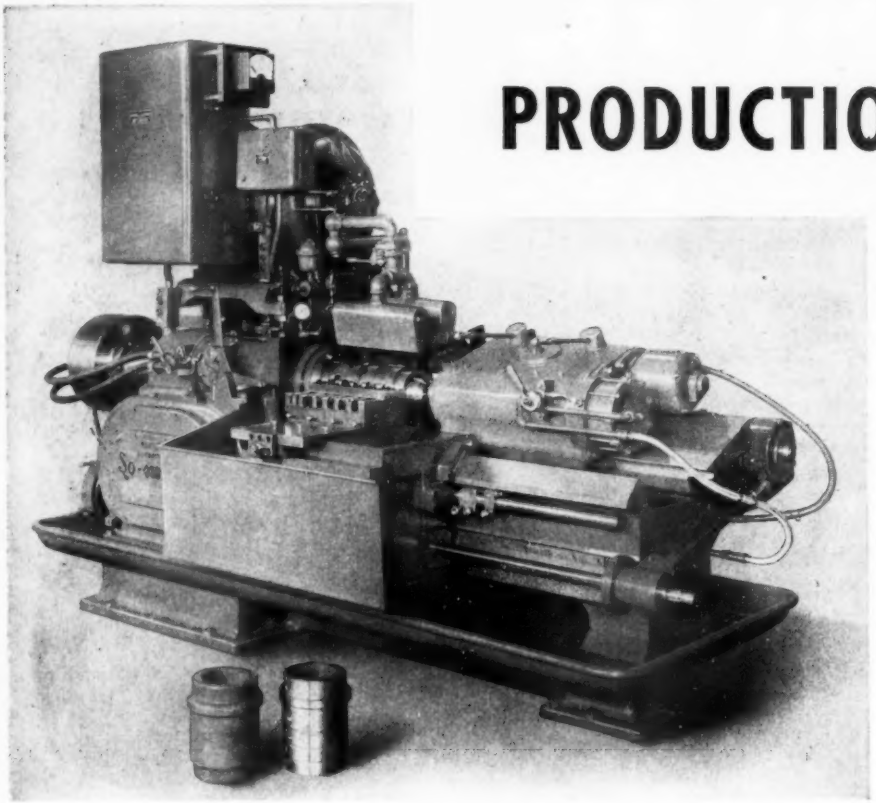
NORTH CHICAGO • ILLINOIS

BIRMINGHAM: *3-2905* • BUFFALO: *Washington 7716* • CHICAGO AREA: *Rogers Park 9500*
CINCINNATI: *Main 5387* • CLEVELAND: *Cherry 0278* • DETROIT AREA: *Madison 6300*
HARTFORD: *32-5197* • MILWAUKEE: *Broadway 3111* • NEW JERSEY AREA: *Journal Square 2-2231*
NEW YORK AREA *Worth: 2-3923* • PHILADELPHIA: *Rittenhouse 8360* • PITTSBURGH: *Atlantic 9699*
PROVIDENCE: *Dexter 1271* • ST. LOUIS: *Newstead 3110* • SYRACUSE, *3-0334*

THE TOOLS THAT GET THINGS DONE

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



PRODUCTION INCREASED ON AIRCRAFT RADIAL MOTOR CYLINDERS

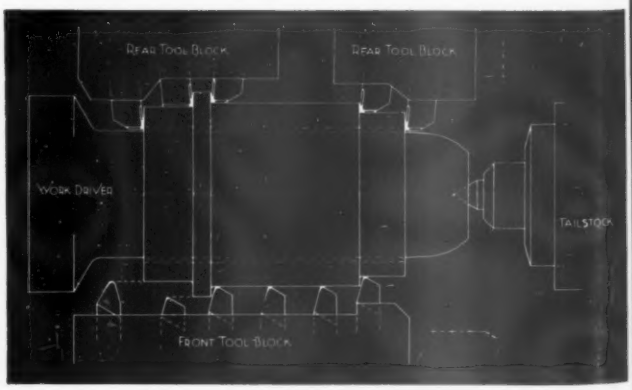
Problem: To increase production on rough turning operation on radial motor cylinders.

Solution: Since the work consisted of rough forgings 9" diameter by 11¼" long with a 5¾" hole, the Model R-14 Lo-swing was selected for this job because it provided the necessary capacity, power and the rigid tool support inherent in Lo-swing design.

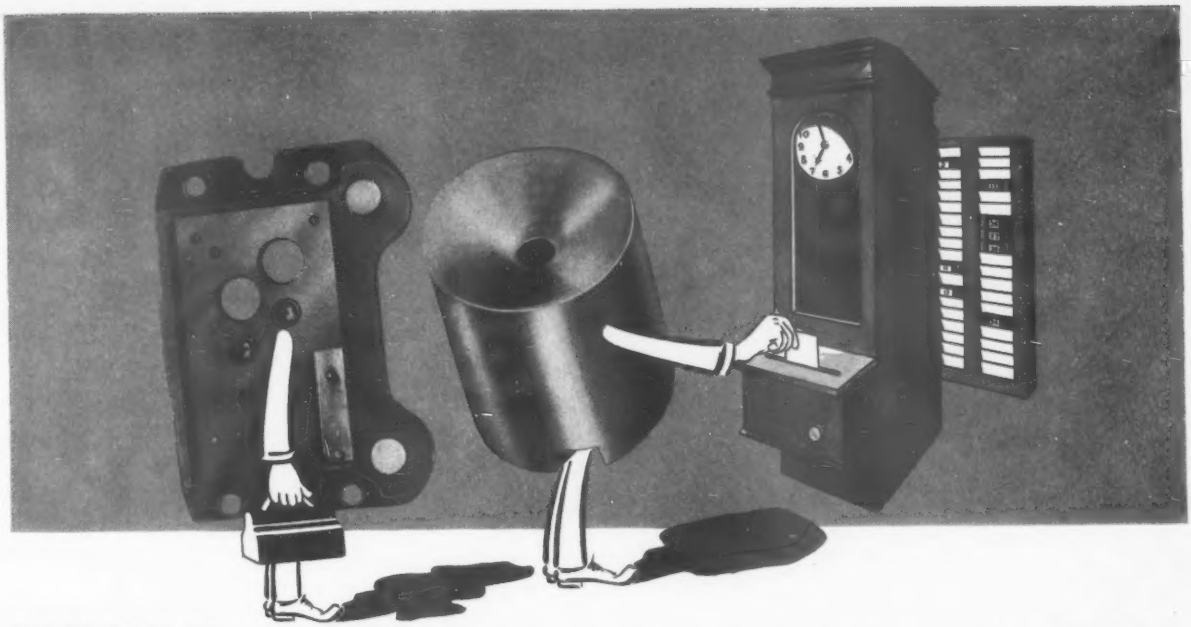
The diagram at the right shows the tooling setup. Six turning tools on the front carriage and five squaring tools on the back attachment perform simultaneously, removing approximately twenty pounds of metal. All tools are cemented carbide.

Other interesting features of this machine include the air-operated driving arbor, designed with six expanding jaws which grip the rough surface of the forging hole. During the turning operation, the outer end of the arbor is supported by the tailstock center. The tailstock itself is moved longitudinally a considerable distance by a motorized rapid traverse mechanism to give ample clearance for loading and unloading work. The spindle starting lever is interlocked with the air line to prevent starting of the machine unless the driver jaws are closed. An ammeter permits continual observation of power consumption.

This lathe is equipped with the fully-mechanical Seneca Falls Quick Change-over Mechanism making it possible to change the stroke by merely setting a graduated dial. Easy access to this mechanism is provided through a sliding door on the carriage front.



LATHE NEWS from SENECA FALLS



TOOLS SHOULD PUNCH THE TIME CLOCK, *TOO!*

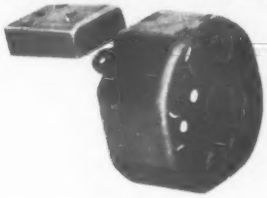
If your tools had to punch out every time they were responsible for stopping machine output . . . you might be startled by their short working time. Right now, when every man and machine is being pushed to the limit of productive capacity, is the time to make sure machines and presses are getting the proper cooperation from tools and dies. Now is the time to *make tools work more hours with fewer interruptions.*

That's where users of Carpenter *Matched* Tool Steels have a definite advantage. They get more output because their tools work longer with fewer stops for regrinding, repairing and replacing. And at the same time they conserve valuable metals.

For the purpose of helping customers get the most out of tool steels, we have prepared a handy MATCHED TOOL STEEL MANUAL. This new Carpenter manual is complete . . . from a MATCHED TOOL STEEL CHART showing how to solve tool making problems the MATCHED SET way . . . to detailed heat treating and drawing instructions. Added to this manual is an 81-page alphabetical *Tool Index and Steel Selector.* It quickly shows which steel best meets the requirements of each tool room job. If you do not already have a copy of this helpful 168-page manual, ask your Carpenter representative. He has one for you.

• The Carpenter MATCHED TOOL STEEL MANUAL, showing sample pages from the Tool Index and Steel Selector.

THIS TOOL PROBLEM WAS SOLVED THE *MATCHED SET* WAY!



The Job:

Piercing die used in piercing slots in 14 gauge hot rolled steel at a production rate of 1,200 pieces per hour.

The Problem:

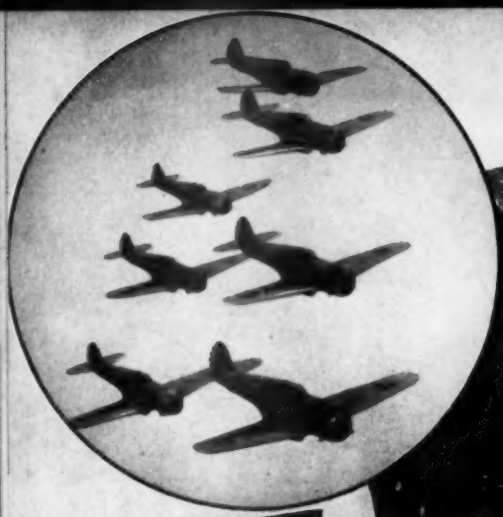
Breakage occurred on narrow side of die after about 2,500 pieces. Heat treatment and hardness tests showed okay.

The Matched Set Solution:

Recognizing the need for a tougher oil-hardening steel to withstand piercing impacts, the Superintendent, guided by the MATCHED SET diagram, selected Carpenter **R.D.S.** **RESULTS:** 1. Breakage overcome. 2. Tool life increased from 2,500 to 1,000,000 pieces. 3. Production per month increased 39,400 pieces, by a saving of 33 hours in tool-caused idle press time.

Carpenter
MATCHED
TOOL STEELS

THE CARPENTER STEEL COMPANY.....READING, PA.



To Keep Em Drilling

Drilling operation on airplane motor crankcase in one of America's foremost motor manufacturing plants

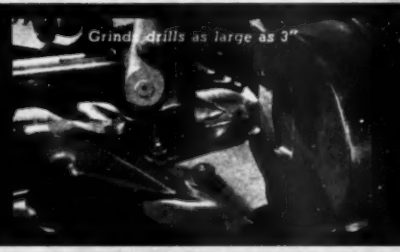
—they are ground on Sellers Drill Grinders

In many great airplane manufacturing plants today Sellers Drill Grinders are used to keep drilling operations on a continuous production basis. Today's urgent demands do not permit the use of skilled machinists' time for grinding, nor can the extra time for hand grinding be allowed even if high accuracy could be attained.

The Sellers Drill Grinder keeps machinists on machine work; keeps spare drills as accurately ground as when new; grinds them to equal length for multiple spindle drilling machines, so that individual spindle adjustment is unnecessary; and by correct and automatic setting grinds away so little steel that drill-life is increased to as much as 2½ times that of hand-ground drills. Write for details.

Sellers Model 6-G Drill Grinder for automatically producing accurate drill points with duplicate lips and correct-clearance... from 1/4" to 3" diameter. Other Sellers Drill Grinders for drills as small as No. 70 (.028")

Reclaims burned and broken drills



Grinds drills as large as 3"

WILLIAM SELLERS & CO., INCORPORATED, PHILADELPHIA, PA.

FOUNDED SELLERS 1848

Sellers

Defense Requirements Demand the Use of MOLYBDENUM High-Speed Steels!

LATROBE

DOUBLE-SIX

HIGH-SPEED TOOL STEEL

..meets this demand with no sacrifice of tungsten efficiency!

LESCO

THE MARK OF BETTER TOOL STEELS

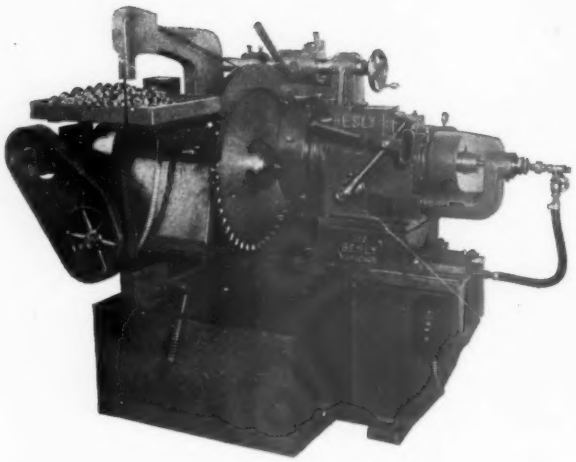
You will find DOUBLE SIX equal . . . and often superior . . . to higher tungsten types. Due to its low tungsten content, DOUBLE SIX High Speed Tool Steel is a valuable help in conserving tungsten for the needs of the defense program.

Its tungsten-molybdenum content provides a proper balance for maximum cutting efficiency, with a minimum of decarburization plus superior heat-treating qualities.

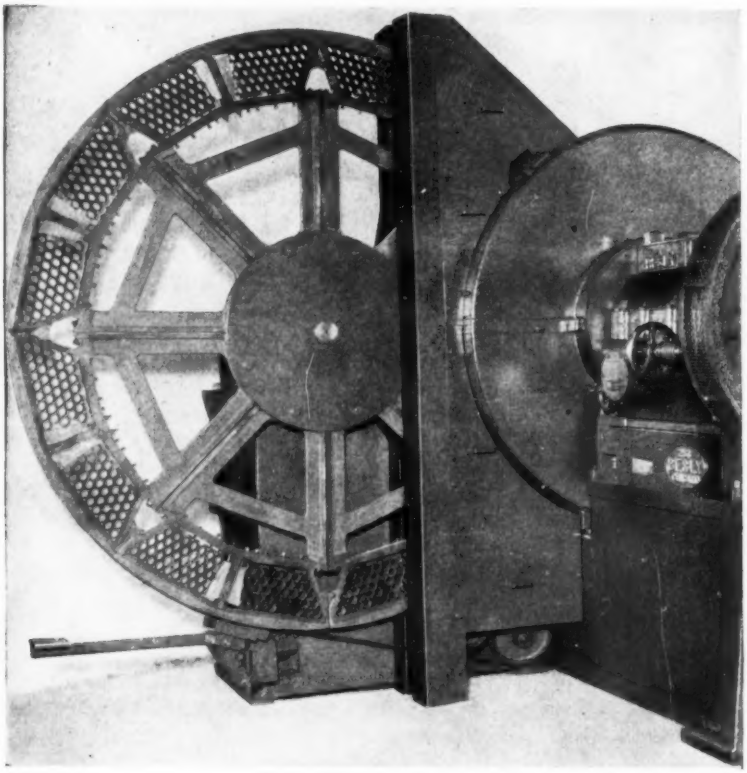
Latrobe ELECTRIC STEEL COMPANY

MAIN OFFICES *and* PLANT .. LATROBE · PENNSYLVANIA

BESLY BUILDS THEM...



from the smallest to the largest. Double Spindle Disc Grinders with grinding members from 12″ to 72″ diameter. With Rotary Feed, Hydraulic Travelling Table, Roll Feed, Power Oscillating Fixture, Hand Operated Swinging Fixture and various other devices for feeding work. Always equipped with Besly Titan Steelbacs, the Resinoid Bonded Bolted-On Abrasive Members, 1″, 2″ or 3″ thick. • These machines are unequalled for production grinding of—coil springs, piston rings, piston pins, carbon brushes, thrust washers, bushings, nuts, wrenches, pliers and similar parts. If you want to finish two opposed surfaces simultaneously, consider the Double Spindle Besly Grinder.

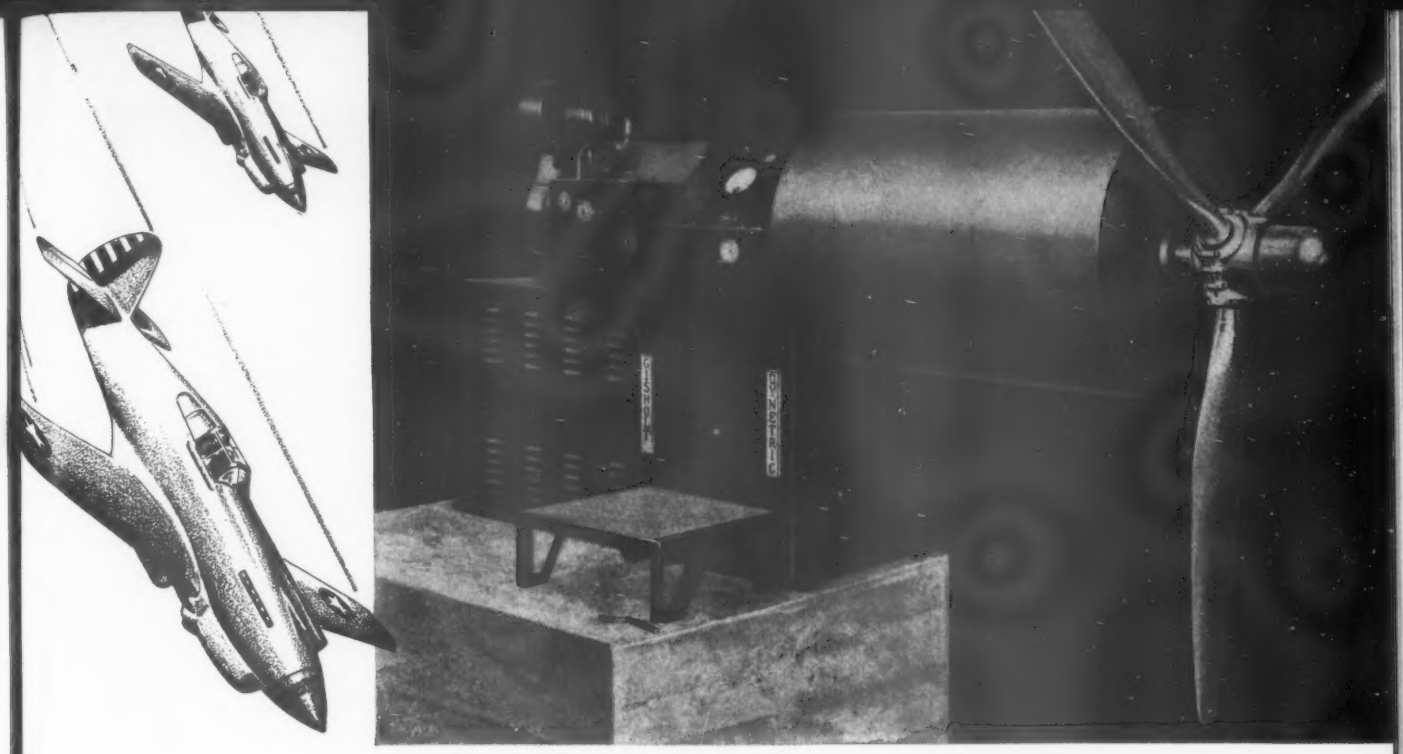


•Send samples, drawings or sketches and let Besly Engineers give you the benefit of their forty years' experience with this type of equipment.

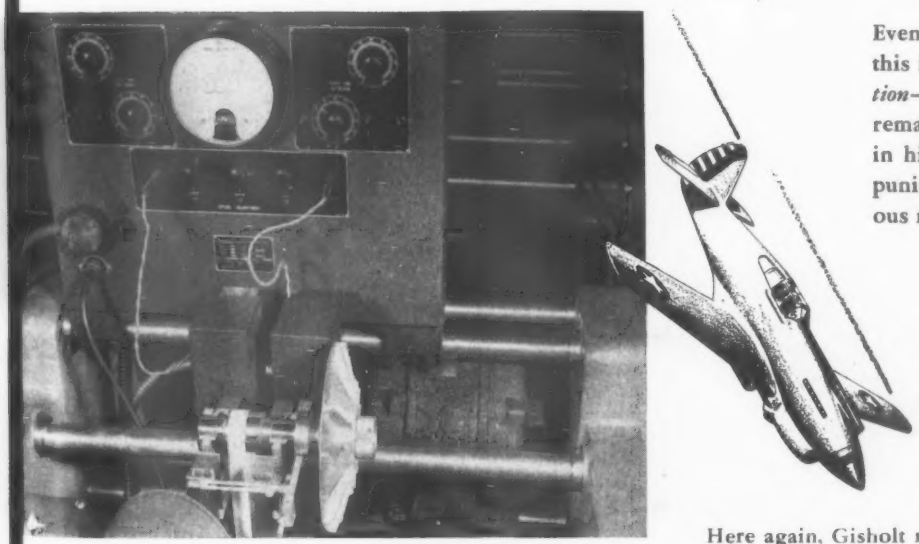
Write for your copy of Booklet on Besly Titan Steelbacs.

CHARLES H. BESLY AND COMPANY

118-124 NORTH CLINTON STREET ★ CHICAGO, ILLINOIS



HOW AN *Unseen Enemy* IS CONQUERED



Even before the new planes take to the air, this invisible but dangerous enemy—*vibration*—must be overcome. For, if allowed to remain, the vibration caused by unbalance in high-speed rotating parts can result in punishing strains, excessive wear, and serious mechanical failures.

Dynetric Balancing Machines

• Here's a particularly difficult and exacting job—the balancing of these supercharger impellers which rotate at speeds up to 30,000 r.p.m. Extreme accuracy is imperative for, at such high speeds, one ounce inch of unbalance creates a centrifugal force of 1600 lbs.! Yet, so precisely are these impellers balanced on this Gisholt Type S Dynetric Balancing Machine that they are successfully carried for sustained operation on small bearings with a load carrying capacity of from 50 to 100 lbs.!

Literature on Gisholt Dynetric Balancing Machines will be sent upon request.

Here again, Gisholt research is answering the call—assisting in the development of new techniques for the dynamic balancing of airplane propellers.

It is but one of many tasks Gisholt Dynetric Balancing Machines are performing daily in the aircraft industry—enabling builders to quickly locate, measure, and correct the unbalanced forces in such high-speed rotating parts as super-charger impellers, radial and "in-line" crankshafts, electric motor and generator armatures, and a host of others.

Again, no doubt, the new Gisholt techniques will become the recognized standards for speed and accuracy in the aircraft industry, as they are for the balancing of rotating parts in all other types of production.

Look ahead . . .
Keep ahead . . .
with Gisholt improvements

GISHOLT

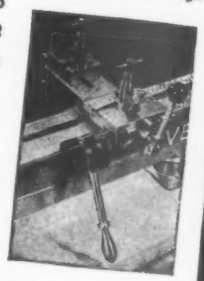
GISHOLT MACHINE COMPANY • 1229 E. Washington Ave., Madison, Wis.

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

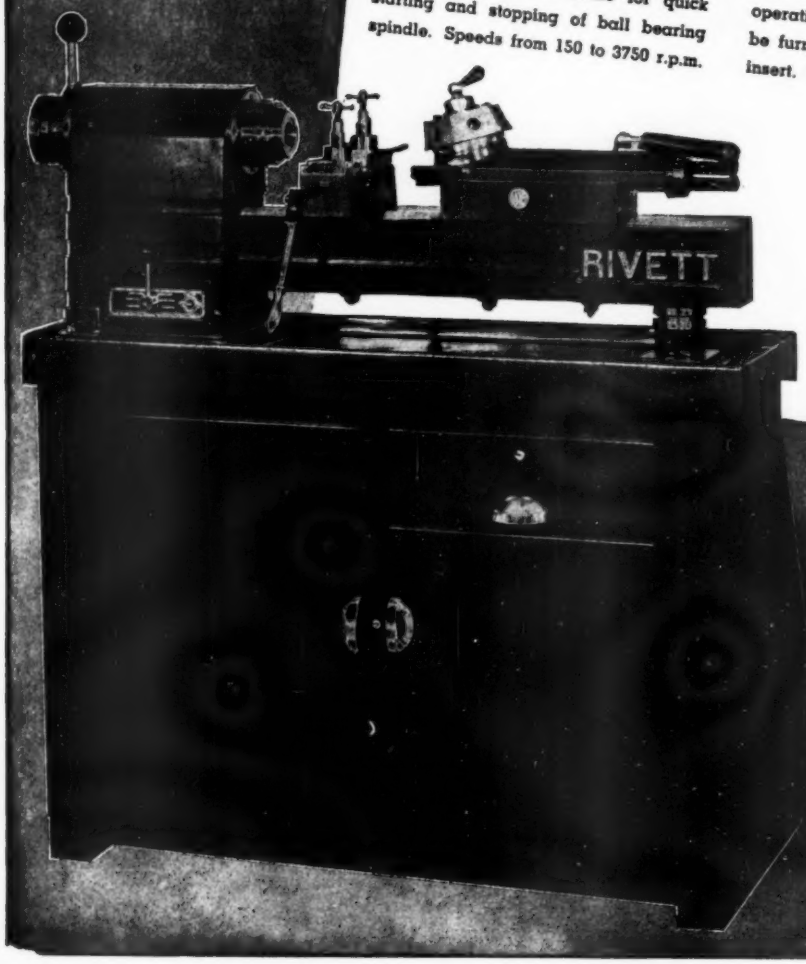
More Precision Work

Duplicate Parts Rapidly Machined

The balanced design and operating features of the Rivett 918 hand screw machine make it an efficient producer on small precision parts. Work is accurately held in collet operated by rotary chuck closer with ball thrust bearing. Single lever controls lathe drive and automatic brake for quick starting and stopping of ball bearing spindle. Speeds from 150 to 3750 r.p.m. can be selected. Automatic indexing turret head revolves on roller bearings and is geared to independent stops. Cross slide carries tools for forming and cutting off. The machine is free from all vibration as it is properly proportioned and dynamically balanced throughout.



Parts requiring up to eight operations can be finish-machined at one chucking. Bar stock passed through spindle can be held in push-out collets up to 1" capacity while work individually chucked can be held in draw-in collets, step chucks or jaw chucks. If a turning operation is required, cross slide can be furnished with a parallel slide; see insert. Oil pump and piping is optional.



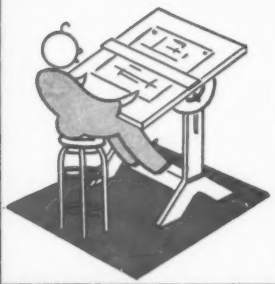
For complete information write for Bulletin 918

ONLY A 3 PAGE CATALOG, BUT FULL OF PROFITABLE IDEAS

• You can get increased production from duplicating your present standard equipment, but here's a better way to do more with fewer machines.

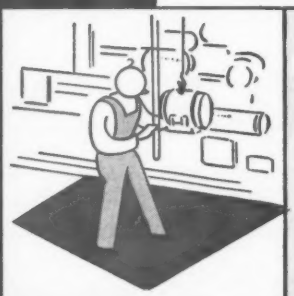
PAGE ONE

Experienced men, familiar with processing and cost saving methods, analyze your problem from the start. Objective: to get the most done with a minimum of cost.



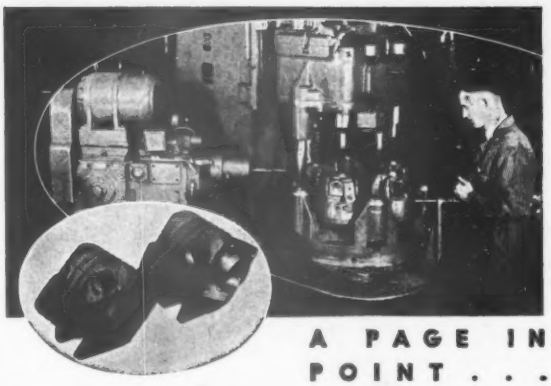
PAGE TWO

Experienced men, familiar with machine design as it fits into processing methods and detailed machine design, create the preliminary and final machine design.



PAGE THREE

Experienced men, familiar with building machines, manufacture and assemble the final machine and put it into profitable production in your plant.



A PAGE IN POINT . . .

● This "one-lunger" gets *seven operations in 33 seconds.* The operations are: Rough, semi, and finish the main bore . . . hollow-mill, face, and drill four holes on the joint face, and drill three holes on the manifold pad. Three standard machines could have handled the job, *but* in about one-third production—meaning nine operators for equivalent production.

The machine we furnished is our 912 . . . *standard,* except for tooling and fixtures. That means you can get the features of standard machines in special machines that *do more for less.*

We've done a lot of this type of machine designing for low, and high production manufacturing . . . will be glad to work with you on your knotty production jobs. More proof of the success of this type of machine building is in our 3 Point Design bulletins . . . write for your copies.

W. F. AND JOHN BARNES COMPANY

ROCKFORD • • • • ILLINOIS

DESIGNERS AND BUILDERS OF DRILLING — BORING — TAPPING — MILLING AND HONING MACHINES TO SUIT YOUR PARTS — YOUR PRODUCTION

Cut Metals with a *Circular Saw*

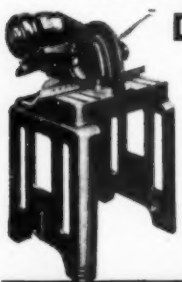
Many plants find Delta Tilting Arbor Saw ideal for Metal-Cutting

The photograph above shows how the Consolidated Aircraft Corporation uses a battery of Delta Circular Saws in its sheet cutting department. These low cost high quality saws are employed here to cut aluminum alloy sheets and shapes into the many different forms required in the manufacture of Consolidated flying boats and patrol bombers.

There are many other places in industry where circular saws can be used effectively for cutting materials other than wood. The Delta Tilting Arbor Saw has many fine features that insure long dependable service. These include: Efficient "texrope" drive that eliminates gears; "sealed-for-life" bearings that reduce maintenance and wear; precision raising, lowering, tilting and mitering adjustments of the extra long table that make possible accurate results in handling large sheets.

Find out how to raise efficiency and lower costs with this saw on your non-ferrous metal-cutting jobs!

Other Low-Cost High Quality DELTA MACHINES



The Delta line includes cut-off machines for cutting solid, extruded and tubular sections with polished smoothness; metal-cutting band saws that have a wide range of uses; standard grinders with special safety and accuracy features; carbide tool grinders; abrasive finishing machines; and a complete line of single and multi-spindle 14" and 17" drill presses.

SEND FOR CATALOG

giving complete details on Delta Tilting Arbor Saw as well as description and prices on the complete line of Delta low-cost, high quality machines and all accessories.

DELTA
MILWAUKEE

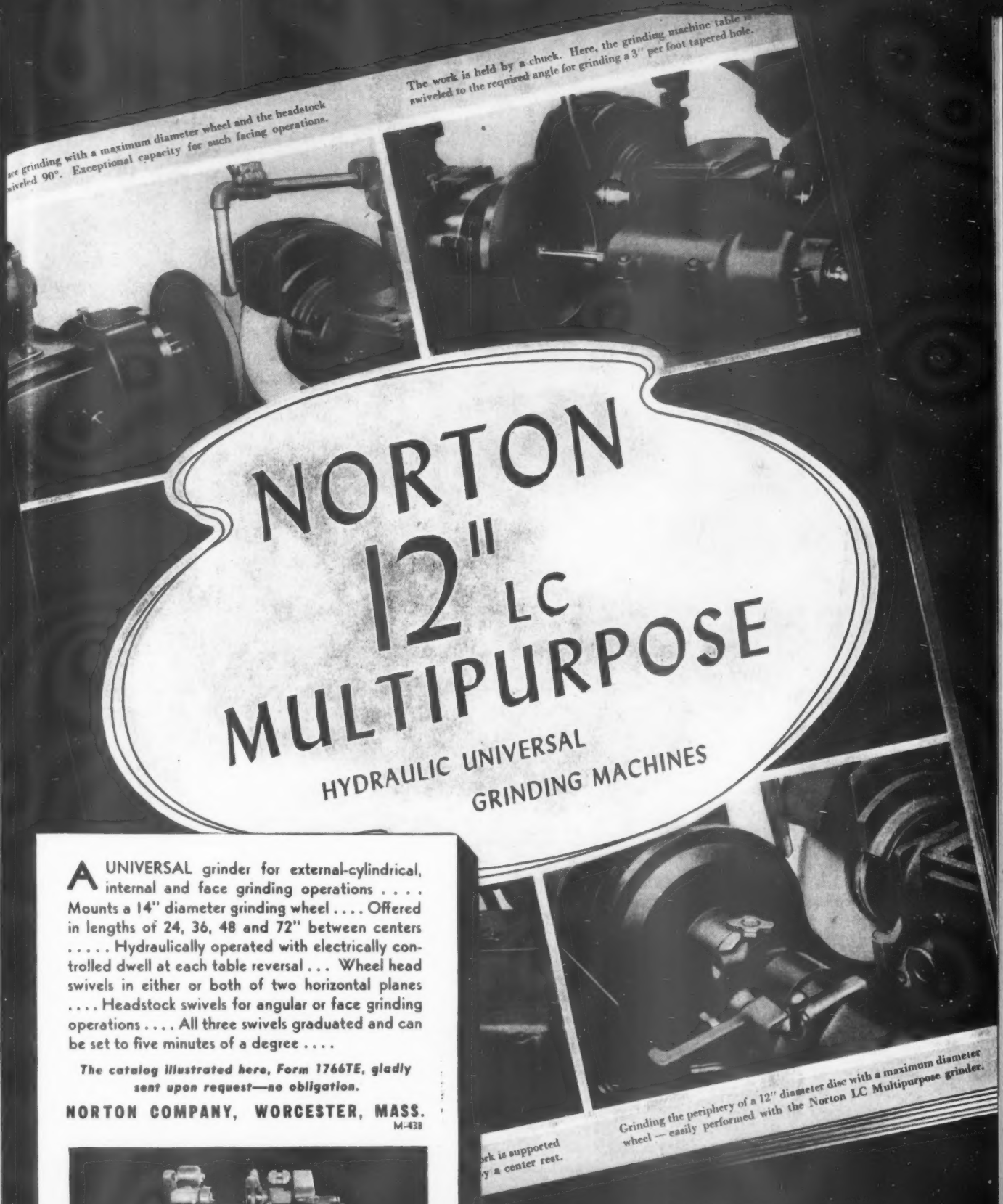
The Delta Manufacturing Company (Industrial Division)
609-K E. Vienna Ave., Milwaukee, Wis.

Please send me the new Delta Catalog giving complete details on the Delta Tilting Arbor Saw—also description and prices on the complete line of Delta low-cost machines.

Name .....

Address .....

City .....

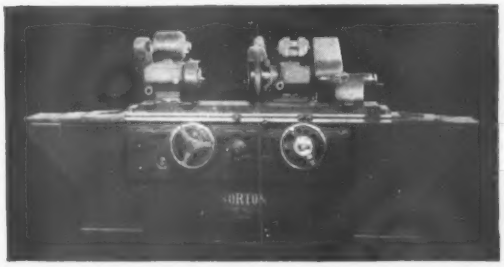

ace grinding with a maximum diameter wheel and the headstock swiveled 90°. Exceptional capacity for such facing operations.
The work is held by a chuck. Here, the grinding machine table is swiveled to the required angle for grinding a 3" per foot tapered hole.
NORTON
12" LC
MULTIPURPOSE
HYDRAULIC UNIVERSAL
GRINDING MACHINES
ork is supported
y a center rest.
Grinding the periphery of a 12" diameter disc with a maximum diameter wheel — easily performed with the Norton LC Multipurpose grinder.

A UNIVERSAL grinder for external-cylindrical, internal and face grinding operations . . . . Mounts a 14" diameter grinding wheel . . . . Offered in lengths of 24, 36, 48 and 72" between centers . . . . . Hydraulically operated with electrically controlled dwell at each table reversal . . . Wheel head swivels in either or both of two horizontal planes . . . . Headstock swivels for angular or face grinding operations . . . . All three swivels graduated and can be set to five minutes of a degree . . . .

The catalog illustrated here, Form 1766TE, gladly sent upon request—no obligation.

NORTON COMPANY, WORCESTER, MASS.

M-438



NORTON
GRINDING MACHINES

New MUNITIONS ENGRAVER

Simplified for FASTER Defense Production

MODEL M-E

Ideal for

- ★ PRODUCTION ENGRAVING
- ★ PROFILING
- ★ Light MILLING

On Accurate Jobs Like This—

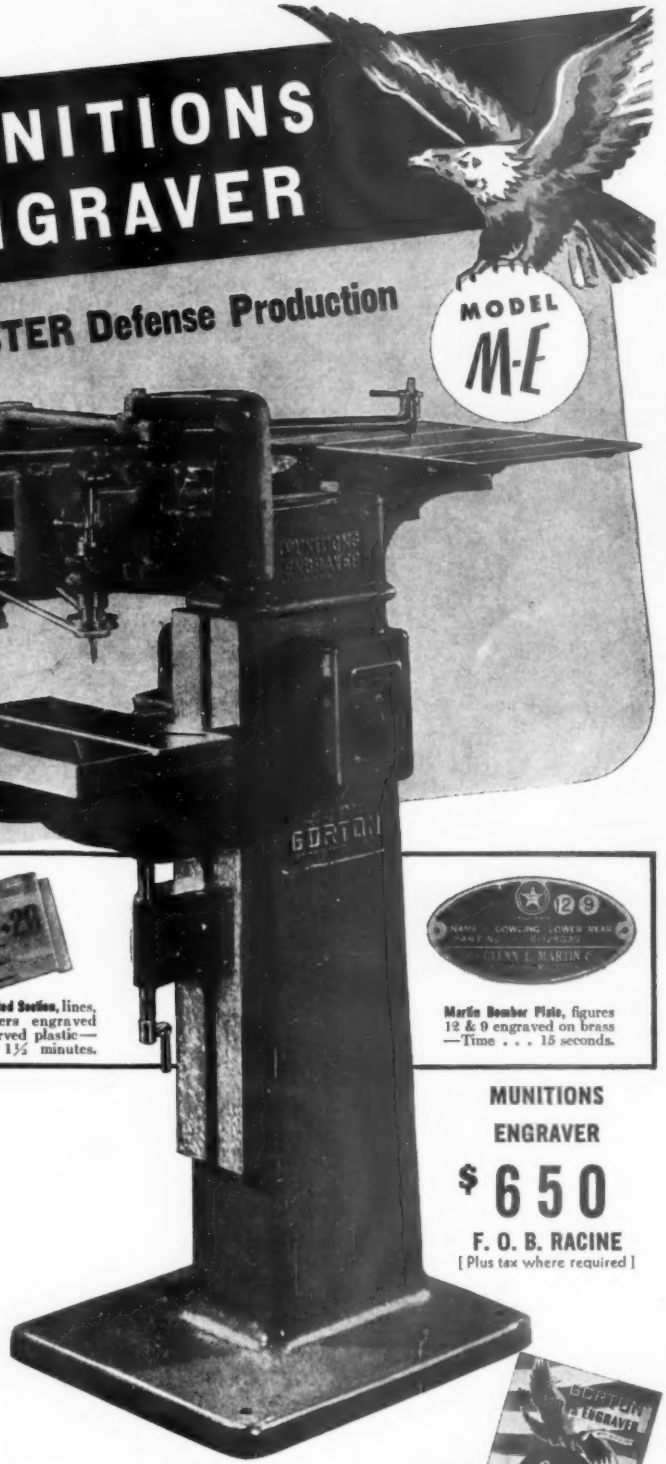
Gun Barrel letters and numbers engraved on steel—Time 5 minutes.

Plane Propeller Pump Housing, packing groove milled—Time 2 minutes.

Side Plate Support, profiled from engravers' brass—Time 5 minutes.

Graduated Section, lines, numbers engraved on curved plastic—Time 1½ minutes.

Martin Bomber Plate, figures 12 & 9 engraved on brass—Time . . . 15 seconds.



THIS NEW GORTON MUNITIONS ENGRAVER is *simplified* in design for rapid *quantity production* of precision munitions parts.

A PRECISION TOOL sensitive enough for wax engraving on glass and rigid enough for cutting in steel—furnished with a fixed pantograph reduction ratio of either 3:1 or 6:1.

SIMPLE TO OPERATE because all unnecessary controls and adjustments have been eliminated. A woman operator can be employed to relieve labor shortage.

MONTHS EARLIER DELIVERY than standard engravers—saves you valuable production time.

MUNITIONS ENGRAVER

$650

F. O. B. RACINE

[Plus tax where required]

SEND TODAY for New M-E Bulletin No. 1635, containing pictures of other defense applications, production times and complete buying information.

GORTON
RACINE, WIS., U.S.A.

GEORGE GORTON MACHINE CO.

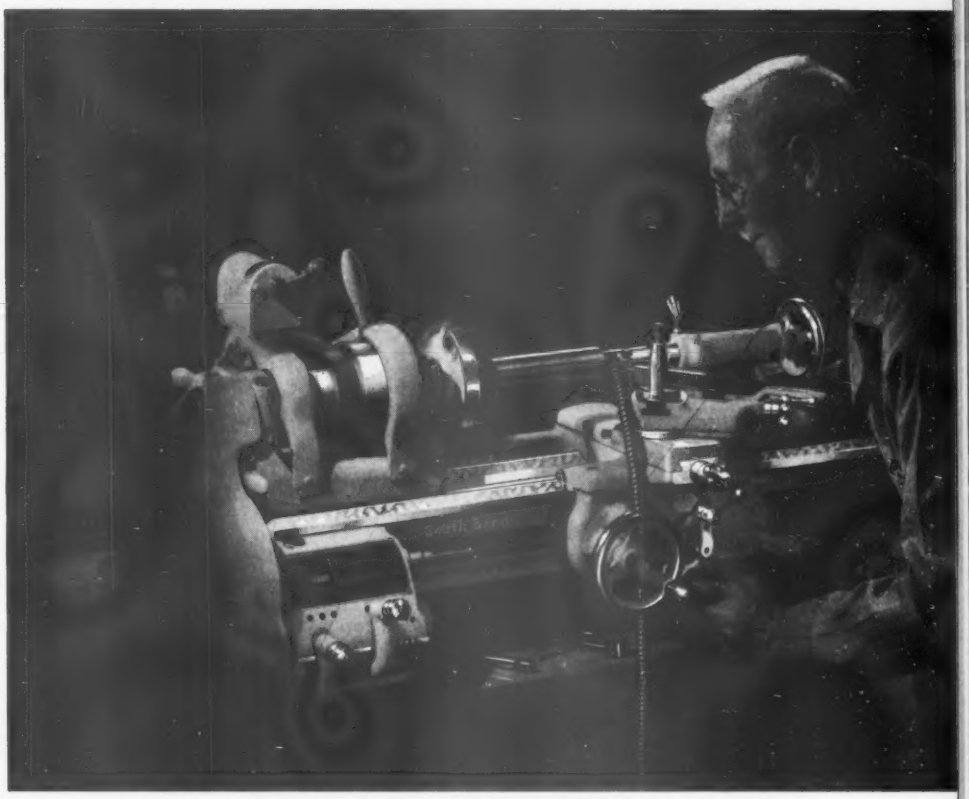
1322 RACINE STREET, RACINE, WISCONSIN, U. S. A.

SOUTH BEND LATHES
for Precision Machine Work

Accurate facing operations can be performed on South Bend Lathes because the cross slide dovetail on each saddle is carefully tested for squareness with V-ways of the lathe bed.

The most exacting precision thread cutting operations can be performed on South Bend Lathes because their lead screws are tested for accuracy of lead with specially constructed optical measuring equipment.

The smooth, quiet operation of South Bend Lathes is the result of the careful inspection and testing of gears for accuracy of tooth form, pitch diameter and concentricity.

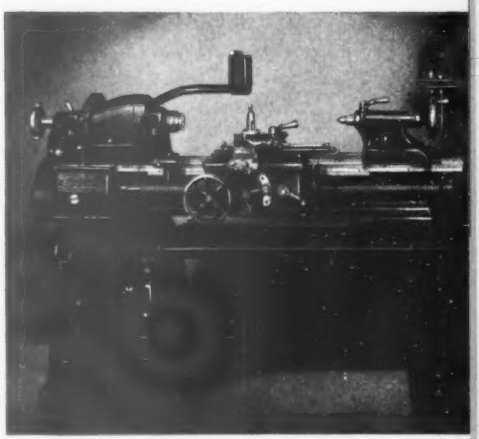


9-inch Model A South Bend Workshop Quick Change Gear Precision Bench Lathe

Sound design, expert workmanship, and quality materials are combined in South Bend Lathes to give them permanent accuracy. For more than thirty years they have been giving dependable, trouble-free service on the most exacting classes of precision machine work.

Throughout the process of manufacture, parts and units for South Bend Lathes are frequently inspected and tested to assure accuracy in the finished product. Final tests are made with the lathe in operation. Each lathe must machine work to extremely close tolerances before it is approved for shipment from our factory.

South Bend Lathes are made in five sizes: 9″, 10″, 13″, 14½″ and 16″ swing, 3′ to 12′ bed lengths, in Tool Room or Manufacturing types, with countershaft or motor drive. Write for a catalog and name of your nearest dealer.



13″ swing Underneath Motor Drive Tool Room Lath

LET'S GO! U.S.A. KEEP 'EM FLYING!

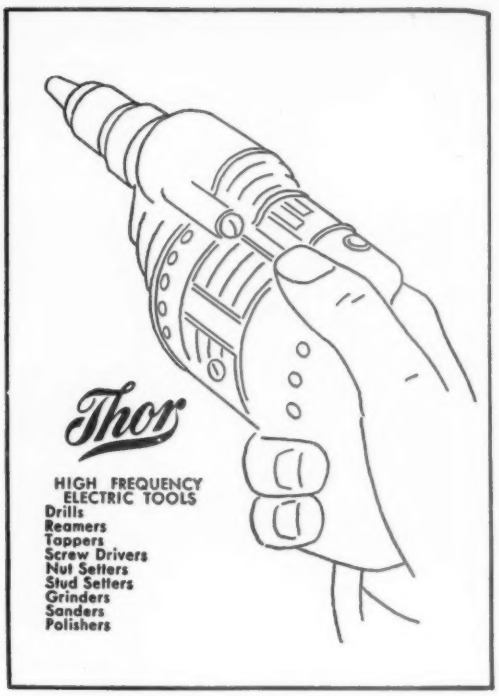
SOUTH BEND LATHE WORKS

924 EAST MADISON STREET, SOUTH BEND, INDIANA, U. S. A.

LATHE BUILDERS SINCE 1906

Get 25% to 50% **more production**

with the same number of power tools as you now have.



You can get this increase now with portable High Frequency electric tools and at the same time make positive savings through

— lower power cost **and/or**
— lower maintenance cost.

If your plant operates ten or more portable power tools the chances are you could increase production from portable tools 25% to 50% . . . and *cut costs at the same time* . . . by using High Frequency electric tools.

There are three simple, basic reasons for this.

Greater Production
— pneumatic tools lose about 25% of their speed under load.

— universal electric tools lose about 50% of their speed under load.

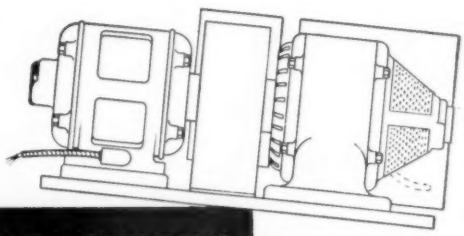
— ***High Frequency electric tools sustain constant speed under load*** . . . which means that you can drill, ream, grind, or do other operations and *maintain* full tool efficiency at all times. With tools that do not slow down, operators do more work in less time; you can increase production with the same number of tools as you now use or maintain it with fewer tools.

Lower Power Cost
— it costs 60% to 75% *less* for power to run a High Frequency tool than for power to run a comparable air tool.

— power costs for High Frequency and Universal electric tools are the same — but you get up to 50% more work with High Frequency from the same amount of power.

Lower Maintenance Cost
— High Frequency electric tools do not have armatures, commutators, brushes, pistons, toggles or many other parts that burn out or wear in universal electric or air tools; repair expense and tool tie-ups are substantially lessened.

Are you wasting Time and Money now?
You can get these advantages of High Frequency electric tools right now. Take this one step today — call in a trained THOR tool engineer. He will gladly study your conditions and give you the facts. And we mean *all* the facts, because THOR manufactures Air and Universal Electric tools as well as High Frequency. So, THOR's recommendations will be unprejudiced . . . and complete! Ask THOR for details now; no obligation, of course.



Why High Frequency portable electric tools are the most efficient you can use.

High Frequency electric tools operate on 180 cycles, 3-phase, 220 volt current. On this current, an induction motor develops three times more speed and power than it would when driven by ordinary 60 cycle current. The High Frequency rotor turns at 10,800 r.p.m. and this speed is *constant*, even under load. Thus, since they do not slow down on the job, High Frequency tools deliver full rated power and productive capacity at all times.

Thor PORTABLE POWER TOOLS
HIGH FREQUENCY ELECTRIC · PNEUMATIC · UNIVERSAL ELECTRIC

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. JACKSON BLVD., CHICAGO, ILL.

BIRMINGHAM, ALA.	LOS ANGELES, CALIF.	SALT LAKE CITY, UTAH
BOSTON, MASS.	MILWAUKEE, WIS.	SAN FRANCISCO, CALIF.
BUFFALO, NEW YORK	NEW YORK, N. Y.	SEATTLE, WASH.
CLEVELAND, OHIO	PHILADELPHIA, PA.	TORONTO, ONTARIO
DENVER, COLORADO	PITTSBURGH, PA.	LONDON, ENGLAND
DETROIT, MICHIGAN	ST. LOUIS, MISSOURI	

Factories At: Aurora, Illinois and Los Angeles, Calif.

"LOGAN"

AIR EQUIPMENT AS USED ON ACME TURRET LATHE

"LOGAN" ROTATING AIR CYLINDER

"LOGAN" SPECIALLY DESIGNED AIR OPERATED COLLET CHUCK

"LOGAN" AIR FOOT VALVE

"LOGAN" LUBRICATION ASSEMBLY

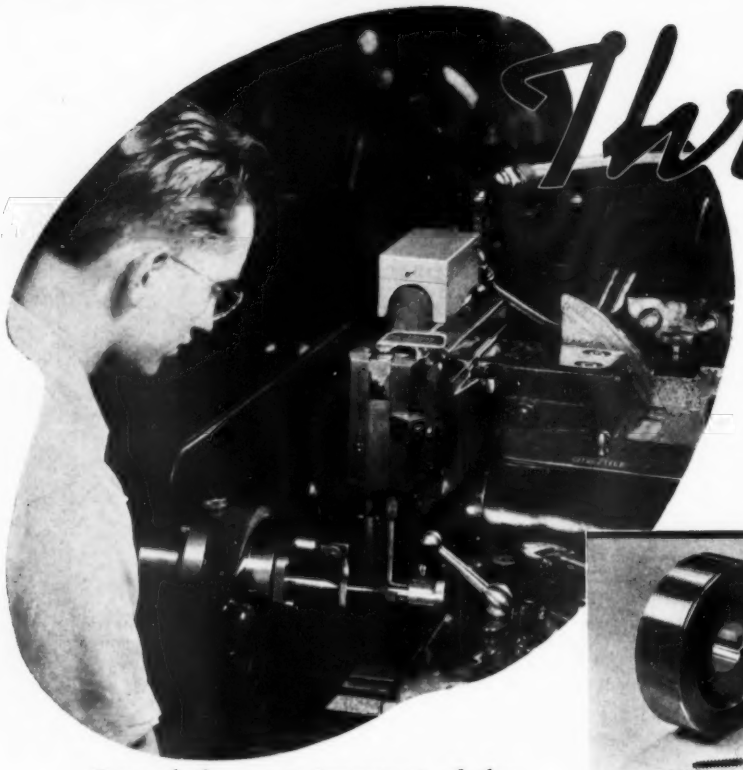
THIS Cincinnati Acme Universal Turret Lathe is fitted with a 6 inch "LOGAN" Air Operated Collet Chuck and a rotating type Air Cylinder and accessories. The special feature of the machine is the headstock, which is provided with an enlarged deep throated spindle with a 15 inch flanged nose, to which the "LOGAN" Collet Chuck and Drawrod is fitted. This arrangement permits the handling of work pieces with minimum overhang and without outboard support. Capacity: Up to 6 inches diameter, with 22 inches from face of chuck to bottom of drawrod. Various types of work locators can be built into the spindle. This heavy duty "LOGAN" equipment assures rigid chucking in machining shells or similar forgings. "LOGAN" Representatives and "LOGAN" Engineers will be glad to make recommendations on your problems.

LOGANSPORT MACHINE, INCORPORATED

902 Payson Road - - - - - Logansport, Indiana

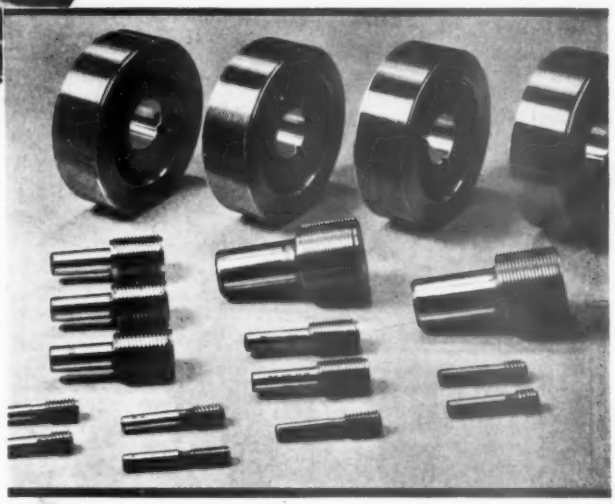
Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

No. 6 IN THE SERIES OF LINCOLN PARK *Firsts*



Threads

Salvaged By CHROME PLATING



One of the most important of the recent achievements at Lincoln Park has been the development of a method to salvage worn thread gages by hard chrome plating. In this process, threads of American National forms which are worn as much as .003" are ground, plated and reground to Class X, Y or Z tolerances. They are restored to original size or to any other size which may be specified provided it is within the salvaging limits.

Here again the facilities and capabilities of Lincoln Park have made possible another "first". With a complete and extremely modern hard chrome plating department in the Lincoln Park plant, every important step in the plating of gages is carefully controlled. With unusual experience in thread grinding—particularly in Carboloy—it has been possible to adapt methods which have proved completely successful for the grinding of chrome plate.

The fact that it is no longer necessary to discard worn thread gages promises future economies for all gage users. In addition, Lincoln Park's chrome plated gages can be depended upon to have a service life approximately three times that of steel gages—further assurance of the most for your "gage dollar".

LINCOLN PARK TOOL and GAGE CO.
LINCOLN PARK, MICHIGAN

NEWS!

LEES-BRADNER *Scores Again*

WITH THE NEW AUTOMATIC

HIGH SPEED THREAD MILLER

The Model 40 generates internal or external threads by the ring or hob type process — in only one and a fraction revolutions of the piece being threaded. Wholly automatic, the NEW Model 40 can be operated at astonishing production speeds.

CUTS PRECISION THREADS

Faster and Better

THE LEES-BRADNER CO., CLEVELAND, OHIO

MACHINE TOOL PRODUCTION . . .

is measured at the workhead. It goes up or down — with the quality of the tools. So give your operators MORSE TOOLS . . . maximum efficiency at the cutting head. Then you'll see why many plants have increased the capacity of their machine tools without buying new equipment.

MORSE

THERE *IS* A DIFFERENCE

TWIST DRILL AND MACHINE COMPANY
NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. - - - - CHICAGO STORE: 570 WEST RANDOLPH ST.

"WE WANTED A COMPLETE, ALL-PURPOSE PROCESS OF MAKING PRINTS...THAT'S WHY WE GOT AN OZALID MACHINE"

BASIC FACTS ABOUT PRINT MAKING YOU SHOULD KNOW

A TRANSPARENT DUPLICATE IS MADE AS EASILY AS A STANDARD PRINT WITH AN OZALID MACHINE . . . no need for special equipment or solutions as required in the Van Dyke or photo copy processes. Ozalid transparent duplicates are made as simply as ordinary work prints . . . by exposure and dry development . . . right in the drafting room, plant or office . . . in a matter of seconds!

Save your valuable original from becoming dog-eared, creased, or soiled from constant handling. Make your prints from Ozalid transparent duplicates and protect your originals from wear and tear.

Changes, corrections, and additions are easily made on Ozalid transparent duplicates by means of the "block out" method or by using Ozalid Corrector Fluid. There is no reason any longer to spend weary hours redrawing or retracing as you'll discover when you get an Ozalid machine.

This is the first of a series of facts on modern print making. Watch for Fact No. 2.

PRINT MAKING has advanced far beyond the outmoded stage of blue prints. Today the demand is for an all-purpose method of making prints . . . a process which turns out a variety of work and does a complete print making job . . . this process is Ozalid.

With the Ozalid Process of making whiteprints you get a quick, versatile reproduction service . . . a wide selection of transparent materials including transparent papers, cloth and foils . . . a choice of black, blue, maroon, or sepia line prints. You get many specialties . . . paper coated on both sides . . . paper laminated on cloth . . . opaque tracing cloth . . . air mail weight paper . . . correctors for eradicating line detail. All have a definite place in making Ozalid the only complete print making process.

Positive type prints and duplicate originals on transparent materials are produced in two easy steps . . . exposure and dry development. There is no washing—fixing—drying—or trimming. As soon as developed, Ozalid prints are ready for immediate use.

In addition to engineering drawings, any pencil or ink lines, typewritten or printed matter on reasonably translucent material, including charts, graphs, reports, etc. are reproduced in this same simple manner. Investigate these facts today. Write for complete literature on the Ozalid Process.

SPECIFY Ozalid WHITEPRINTS

OZALID PRODUCTS DIVISION
GENERAL ANILINE & FILM CORPORATION
JOHNSON CITY, N.Y.
Ozalid in Canada • HUGHES OWEN CO. LTD., Montreal

Built to take the kinks out of big pieces—*controlled with a Finger-tip touch*

Capacity 35 tons, table 120 in., fixture rails 26 ft., furnished with centers or roller type fixtures.

While National Defense needs are taking most of our greatly enlarged plant capacity, we will continue every possible assistance to users of Hannifin production tool equipment. Standard types of Hannifin hydraulic and pneumatic equipment may be modified to meet individual needs, avoiding delays due to special design. Hannifin engineers will give you specific recommendations.

Fast, accurate straightening of gun barrels and similar long parts is easy with this Hannifin Hydraulic Press, because of the simplicity of the exclusive sensitive pressure control. Pressure exerted at the ram is under infinitely variable control by a single hand lever or foot pedal. Finger-tip movement of the lever provides any desired ram pressure from a few pounds up to full capacity. The farther the control lever is moved down the greater the ram pressure. Release of the lever gives a rapid return stroke to top ram position. Up stroke may be adjusted to suit the work.

Hannifin Hydraulic Press Control is so simple, so naturally related to straightening operations that precision work is easily accomplished at high speeds. Hannifin Presses with sensitive pressure control are built in many types, for straightening, press-fit assembly, and similar work, in capacities from 5 tons to 200 tons. Consult Hannifin engineers, or write for bulletins giving details of many types.

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HANNIFIN Hydraulic Presses

THE TOOL ENGINEER

TRADE MARK REGISTERED
IN U. S. PAT. OFF.

SEPTEMBER, 1941

Volume X, No. 9

Canton Points The Way

THE first criticism that was leveled at the operation of our Defense Program was an accusation that the largest corporations were getting all the defense business; that the many small and middle sized businesses were being slighted; that while unfilled orders accumulated at some plants, others had unused capacity they were unable to peddle. That criticism is perhaps as applicable still as it was when first made. Little or nothing has been done to alleviate it.

There was good reason for the course of action taken. The government had to do a tremendous amount of purchasing in the quickest way—and the quickest way was to pass out large contracts to large corporations. It was expected that they in turn would sub-contract and distribute the production among smaller firms. To some extent they did; but for the reasons that impelled the Government to make original contracts large, the sub-contracts were confined principally to medium and large size plants.

This situation was not too inconvenient while smaller firms were kept busy on consumer orders, and was primarily kept a prominent subject because it provided a likely target for the use of administration critics.

Recently the picture has changed.

Today we are entering a period of curtailed consumer production, of material shortages; a period in which large contractors are overworked while machines begin to lie idle in thousands of small plants.

While many a small manufacturer and many a citizen has been sitting around grieving about the hopelessness of this situation one group has done something about it.

In Canton,Ohio twenty-six small firms joined to form a central organization called The Canton Defense Production Association. An independent consultant was called in to survey the potentialities of the combination. They found that among them they had 1372 employees and 807 machine tools. They made up a list of the things they are now doing and a list of the types of jobs they could handle.

Today any prime contractor who finds it necessary to sub-contract part of a defense order can probably tell at a glance whether Canton can handle the order or not. If it can, the association sends an engineer to work out the details.

Canton has an idea, and by cooperation they have developed it successfully. While many small firms are wandering around asking how to get Defense Business they have set to work and prepared the way for the prime contractor to utilize their resources.

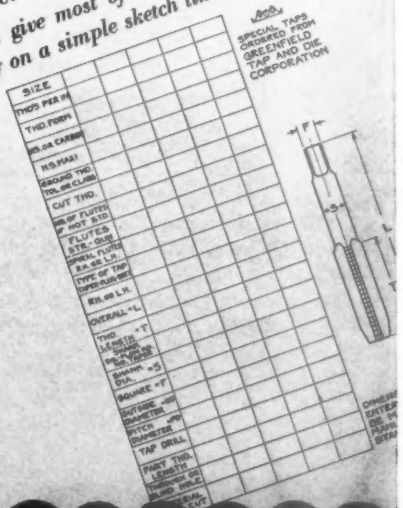
This is not necessarily the solution for all America, but it will probably prove the solution for Canton and may be adapted for use in many another locality. At any rate here is a lesson for all of us. Instead of sitting around and worrying about the lack of Defense Business, these Canton firms went out and did something about it. Canton pointed the way, the aggressive way, the American way.

14 POINTS on SPECIAL TAPS

OLDSTERS remember Woodrow Wilson's "14 points." Here are 14 that are often overlooked, which have to do with ordering special taps. If you can remember to check each one when you order (and furnish a sketch or blueprint, too) your special taps will be *right* and properly suited to the work to be performed.

1. State exact cutting size, number of threads per inch, and form of thread. (If Multiple Thread, state the *lead* in inches and whether Double, Triple, etc. Example: 1"—8 Acme ¼" Lead Double.)
2. Is right or left hand thread required?
3. What style of tap is wanted, Taper, Plug or Bottoming Hand Tap, "Gun" Tap, Nut Tap, Tapper Tap, Pulley Tap, etc.?
4. Should taps be High Speed or Carbon Steel?
5. Are taps to be furnished with cut or ground threads?
6. If threads are to be ground, what class of fit is to be produced?
7. What is overall length; thread length; and style, length and diameter of shank?
8. How many flutes, if not standard, and shall they be straight, spiral or "*Gun?*"
9. If spiral flutes are wanted, should they be right or left hand spiral?
10. What length of thread is to be cut?
11. Will tap be used in "through" or blind holes?
12. What is size of hole before tapping, and what is depth of hole to be tapped?
13. What kind of material is to be tapped?
14. Are taps to be used by hand or in a machine? If machine, advise type.

You can give most of the information briefly and correctly on a simple sketch like this.



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This is one of a series of advertisements published by Greenfield Tap & Die Corporation to help users get greater production from their small tools in these critical times, through making useful facts more widely known

Selection of Ball Bearings

A comprehensive digest of data on ball bearings intended to serve the Tool Engineer who is concerned with the general problem of ball bearing selection.

By J. S. TAWRESEY
Assistant Chief Engineer
SKF Industries, Inc.
Philadelphia

EDITOR'S INTRODUCTION

CONVENTIONAL bearing catalogs include numerous tables relating to different series and sizes of bearings. These have not been combined into a brief comprehensive form providing the designer with a single concise reference to the ball bearing field as a whole. The arrangement presented here is intended to fill that need, and to also comprise a ready digest of standard ball bearing data for other engineers, executives and purchasing departments.

The sizes and nominal dimensions of the standard series of ball and roller bearings are manufactured in metric dimensions by a number of companies in keeping with the recommendations of the International Standards Association (ISA), Annular Bearing Engineers' Committee (ABEC) and the Thrust Bearing Engineers' Committee (TBEC) and other engineering societies. Fundamental dimensions have been chosen to insure maximum capacity within restricted dimensions. The basic nomenclature refers to the bore of the bearings as follows:

A. The size of a Standard Bearing is designated by three, or the last three figures of a four or five digit number. In the latter instance, the first one or two figures represents the type. These numbers frequently vary between manufacturers for similar types of bearings; whereas, the remaining three size numbers in general are as published in the SAE Code for Annular Ball Bearings.

B. The third number from the right indicates the Series: for a 10 mm. bore bearing, 000 would represent the smallest Standard size of the Extra Light Type (this Series is frequently used on machine tool precision applications), the 100 bearing would have the same bore and is an intermediate Extra Light Type. Both of these Extra Light types are considered special purpose bearings to be used only upon the recommendation of a bearing engineer. The more popular types are the 200, 300 and 400 Series bearings and are respectively the Standard Light, Medium and Heavy Duty series.

C. As may be seen from Table I the last two figures on the right designate the bore. 00 is the smallest Standard size and has a 10 mm. bore. For bearings of 20 mm. bore and larger, the bore in mm. is divided by 5 and this value represents the code size. As 00 represents 10 mm., it and the next three sizes are exceptions to the rule, 01 equals 12 mm.; 02 equals 15 mm.; and 03 equals 17 mm. (Extra Small Bearings are available in bores from 4 to 9 mm. inclusive, but they are not included in the standard classification.)

D. The outside diameter of the bearings are respectively larger with the heavier series of higher capacity. Uniform dimensions for both bore and O.D.'s of bearings permit the interchangeable use of jigs and fixtures for bearings of different types and series.

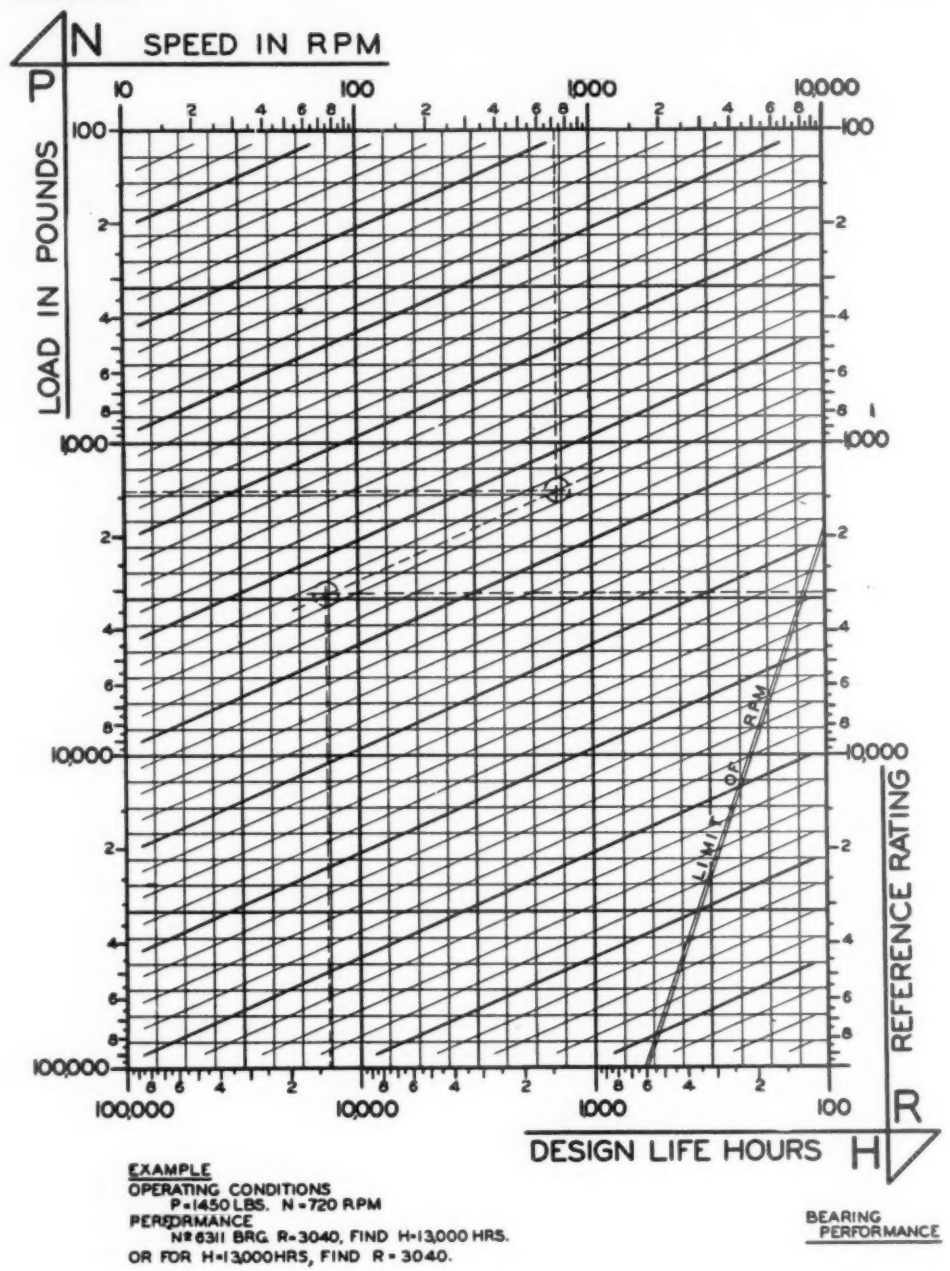
A brief study of the chart and nomograph with the supplementary table should be of particular interest and assistance to the designer. Roller bearings were formerly an exception to the above nomenclature being designated by their millimetric bores. There is now a trend to have them be known by the same size numbers as the ball bearing series where their external dimensions are completely interchangeable.

The following copyrighted digest has been compiled by Mr. J. S. Tawresey, Assistant Chief Engineer, S K F Industries, Inc., and is being printed with their permission. Reprints are available upon request.—EDITOR.

(Mr. Tawresey's article begins on page 49. On the intervening pages are the charts and tables used in bearing computations.)

CHART 1

BEARING SELECTION CHART



In using the chart, operating conditions defined in terms of load and speed are located on the 'P' and 'N' scales, from which points the chart is entered to locate the diagonal guide line passing through their common intersection. This guide line then defines the intersection of corresponding values of reference rating and design life, located on the 'R' and 'H' scales, and serving to measure the performance of any particular bearing size. In entering or reading from the chart it is important to use together corresponding values of load and speed, and corresponding values of reference rating and design life. The reference rating for a given bearing can be calculated by taking 1/3 of the capacity at 75 RPM, as listed in S K F Engineering Data Sheets.

FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4

STANDARD BALL BEARINGS

ALL DIMENSIONS IN MILLIMETERS. "R" REFERENCE RATING IN POUNDS FOR 1,000 RPM AND 1,000 HRS.

BASIC BEARING NUMBER		00		01		02		03		04		05		06		07	
BORE		10		12		15		17		20		25		30		35	
		WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R
OUTSIDE DIAMETER		30		32		35		40		47		52		62		72	
LIGHT	SERIES																
	1200 Figure 1	9	220	10	225	11	315	12	350	14	460	15	580	16	765	17	850
	6200 " 2	"	190	"	300	"	325	"	405	"	545	"	805	"	815	"	1110
	7200 " 3*	—	—	—	—	—	—	—	—	—	—	"	1200	"	1740	"	2270
	2200 " 1	14	270	14	300	14	320	16	410	18	545	18	595	20	760	23	1085
	5200 " 4	"	305	15.9	527	15.9	527	17.5	651	20.6	895	20.6	950	23.8	1360	27	1790
		35		37		42		47		52		62		72		80	
MEDIUM	SERIES																
	1300 Figure 1	11	295	12	380	13	405	14	545	15	570	17	840	19	1030	21	1250
	6300 " 2	"	375	"	455	"	505	"	600	"	710	"	925	"	1222	"	1470
	7300 " 3*	—	—	—	—	—	—	—	—	"	1440	"	2020	"	2570	"	3070
	2300 " 1	17	420	17	460	17	500	19	595	21	785	24	1030	27	1360	31	1710
	5300 " 4	—	—	19	735	19	815	22.2	980	22.2	1140	25.4	1520	30.2	1980	34.9	2340
								62		72		80		90		100	
HEAVY	SERIES																
	10400 Figure 1							—	—	—	—	21	1250	23	1505	25	1910
	6400 " 2							17	1070	19	1440	"	1630	"	1820	"	2360
	7400 " 3*							—	—	—	—	"	3400	"	3950	"	5050
	5400 " 4							—	—	—	—	34.9	2610	39.7	3430	44.4	3910

BASIC BEARING NUMBER		08		09		10		11		12		13		14		15	
BORE		40		45		50		55		60		65		70		75	
		WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R
OUTSIDE DIAMETER		80		85		90		100		110		120		125		130	
LIGHT	SERIES																
	1200 Figure 1	18	1075	19	1220	20	1330	21	1530	22	1820	23	1880	24	2090	25	2370
	6200 " 2	"	1250	"	1410	"	1520	"	1850	"	2260	"	2470	"	2670	"	2830
	7200 " 3*	"	2740	"	3060	"	3340	"	3940	"	4700	"	5350	"	5860	"	6050
	2200 " 1	23	1170	23	1280	23	1330	25	1550	28	1930	31	2420	31	2500	31	2600
	5200 " 4	30.2	2000	30.2	2275	30.2	2440	33.3	2980	36.5	3640	38.1	3960	39.7	4290	41.3	4550
		90		100		110		120		130		140		150		160	
MEDIUM	SERIES																
	1300 Figure 1	23	1520	25	1950	27	2170	29	2600	31	2980	33	3270	35	3840	37	4120
	6300 " 2	"	1765	"	2280	"	2660	"	3040	"	3680	"	3860	"	4350	"	4780
	7300 " 3*	"	3720	"	4860	"	5650	"	6580	"	7500	"	8320	"	9100	"	10000
	2300 " 1	33	2150	36	2440	40	2880	43	3360	46	3850	48	4400	51	4930	55	5440
	5300 " 4	36.5	2870	39.7	3690	44.4	4280	49.2	4960	54.0	5440	58.7	6250	63.5	6790	68.3	7600
		110		120		130		140		150		160		180		190	
HEAVY	SERIES																
	10400 Figure 1	27	2170	29	2610	31	2970	33	3280	35	3280	37	4100	42	5070	45	5800
	6400 " 2	"	2770	"	3370	"	3740	"	4350	"	4850	"	5260	"	6510	"	7050
	7400 " 3*	"	5900	"	7000	"	7800	"	9050	"	9900	"	10700	"	14300	"	14800
	5400 " 4	49.2	4450	54.0	5625	58.7	6950	63.5	6950	66.7	7600	71.4	10200	79.4	10200	82.6	11400

BASIC BEARING NUMBER		16		17		18		19		20		21		22	
BORE		80		85		90		95		100		105		110	
		WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R	WIDTH	R
OUTSIDE DIAMETER		140		150		160		170		180		190		200	
LIGHT	SERIES														
	1200 Figure 1	26	2500	28	3000	30	3420	32	3840	34	4200	36	4520	38	5150
	6200 " 2	"	3100	"	3535	"	4070	"	4520	"	5000	"	5440	"	5970
	7200 " 3*	"	6900	"	7600	"	8900	"	9800	"	10700	"	11600	"	12900
	2200 " 1	33	2820	36	3360	40	3950	43	4620	46	5260	50	5700	53	6520
	5200 " 4	44.4	5050	49.2	5750	52.4	6520	55.6	7350	60.3	8150	65.1	8960	69.8	9790
		170		180		190		200		215		225		240	
MEDIUM	SERIES														
	1300 Figure 1	39	4610	41	5040	43	5700	45	6500	47	7050	49	7860	50	8460
	6300 " 2	"	5260	"	5700	"	6250	"	6790	"	7860	"	8410	"	9500
	7300 " 3*	"	11200	"	12000	"	13300	"	14600	"	16500	"	17900	"	19800
	2300 " 1	58	5970	60	6530	64	7060	67	7600	73	8960	77	9780	80	10600
	5300 " 4	68.3	8410	73	9240	73	10100	77.8	10900	82.6	12500	87.3	13600	92.1	15200
		200		210		225		240		250					
HEAVY	SERIES														
	10400 Figure 1	48	6450	52	7120	54	7700	—	—	—	—				
	6400 " 2	"	7650	"	8150	"	8600	—	—	—	—				
	7400 " 3*	"	15800	"	17000	"	10200	55	22600	58	23800				
	5400 " 4	87.3	12100	92.1	13000	—	—	—	—	—	—				

METRIC CONVERSION TABLES
Millimeters to Inches and Inches to Millimeters
PAGE 6

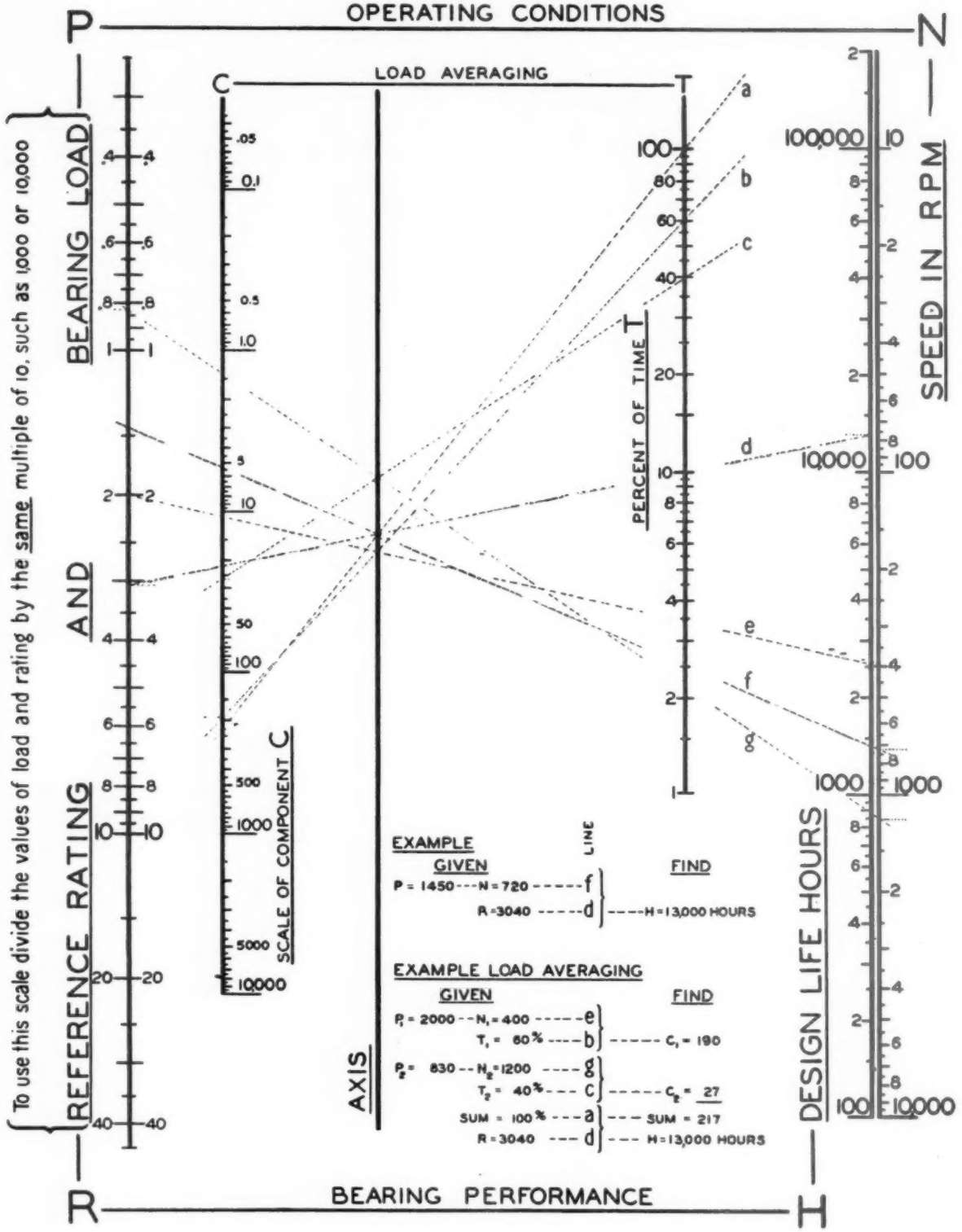
* Angular Contact Bearings are rated in Thrust Load.

TABLE 1

CHART II

LOAD-LIFE CHART

LINE THRU CORRESPONDING VALUES OF P AND N INTERSECTS AXIS AT SAME POINT AS LINE THRU CORRESPONDING VALUES OF R AND H, AND OF C AND T



Selection of Ball Bearings

(Continued from page 45)

BEARINGS are manufactured in an extensive series of internationally standardized dimensions. The use of such standard sizes is of primary importance in assuring commercial availability and in providing for service replacement.

Dimensions are based on the metric system and are expressed in millimeters. Standard bore sizes range from 10 mm. to 110 mm., in 5 mm. increments, except for the 12 mm. and 17 mm. sizes. The extra small and the extended series provide sizes below and above this range in certain types. Corresponding to a given bore size there are three principal series available, known as the light, medium and heavy series. These differ in outside diameter and width and have load capacity in proportion to their dimensions. Extra light and extra narrow series are available in certain types.

Information regarding extra small, extended series, and extra light types is not included herein as such bearings are employed in special rather than general application. Data regarding ball size, corner dimensions and shoulder heights are detailed considerations that are listed in complete Data Sheets.

The principal types can be classified in accordance with their design features and load carrying characteristics.

Self-Aligning Ball Bearings

Primarily suited for radial load *(Figure 1)*, the self-aligning ball bearing has a self-contained construction with spherical outer raceway which permits inner race and ball assembly to freely adjust itself for errors in alignment and load deflections of appreciable magnitude. This feature obviates internal stress due to cramping and makes available the full bearing capacity for external applied load.

Bearings of the 1200, 1300 and 10,400 series interchange with the standard single row series. Their thrust capacity is relatively low whereas those of the wide type, series 2200, and 2300, have a more favorable thrust capacity due to a wider contact angle.

Single Row Groove Type

Designed for radial and thrust load in either direction *(Figure 2)*, the Single Row Groove Type Bearings have balls engaged in deep uninterrupted grooves and the bearing has substantial thrust capacity for loads in either direction. This type is generally used for carrying combined radial and thrust loads in any proportion and finds wide application in automotive and industrial equipment.

Double Row Groove Type

Adapted to heavy radial and thrust load in either direction *(Figure 4)*, the Double Row Groove Type Bearing is suited to loads heavier than provided for by the single row construction. It is intended for combined radial and thrust load in any proportion and has a lower total axial displacement than is obtainable with the single row type. The maximum permissible speeds are lower and the bearing is inherently more rigid than for corresponding single row sizes.

Single Row Angular Contact Type

Primarily suited for thrust load in one direction *(Figure 3)*, the Single Row Angular Contact Type Bearing is designed as an annular type of thrust bearing; it has a relatively high contact angle and is adapted to heavy thrust load in one direction only. Under suitable conditions it can carry some radial load in combination with a principal thrust component.

Supplementary Types

There are a number of supplementary types obtained by modification of the principal basic ones described above. These include adapter sleeve bearings derived from the self-aligning type; and single and double plate seal bearings, and snap ring bearings derived from the single row groove type.

The selection of the proper type of ball bearing is influenced by general considerations affecting the design as a whole. Thus single row groove type bearings are almost universally used in automotive equipment, self-aligning bearings are widely used in certain production machinery, while both bearing types are found in the electrical and machine tool field. Basically the choice of bearing type is dependent upon the character of the load to be provided for and consideration of requirements as to yield and deflection. Where extremely exacting limits of precision apply, bearings can be obtained in special tolerance classification groups.

In many instances the desired bearing size is governed by shaft diameter and the dimensions of other associated parts. In order to decide upon the suitability of a particular bearing it is necessary to check the load capacity against requirements imposed by operating conditions. The use of numerical factors for this purpose is an indirect and arbitrary procedure which has been superseded by direct calculation of the bearing life under given conditions of load and speed.

The load-life principle is applied by equating a suitable measure of the demand made by operating conditions to a corresponding measure of the performance of any given bearing. This relation is expressed as follows:

Operating Conditions . . Bearing Performance

Or by the formula:

$$\frac{P^3 \left(\frac{N}{1{,}000}\right)}{} = \frac{R^3}{\left(\frac{H}{1{,}000}\right)}$$

P = Normal Average Load in Pounds.

N = Average Speed in rpm.

*R = Reference Rating of the Bearing.

**H = Design Life obtained from the bearing.

**Reference Rating* Values are tabulated in *Table I* corresponding to the bearing sizes listed. This rating is specifically the load capacity of the bearing when operating at a speed of 1,000 RPM and for a design life of 1,000 hours. It must not be confused or interchanged with other catalog ratings prepared on a different basis.

***Design Life* is the life which will be attained by at least ninety per-cent of a group of bearings subjected to

the given operating conditions. It is employed as a criterion of design and is of particular value since it refers to the poorest performance to be expected. The average life of the entire group will be five times the design life as calculated. The average life serves as an indication of the requirement for bearing replacement in service.

The load-life equation shows that given operating conditions of load and speed serve to establish a definite ratio between the reference rating of any bearing and the corresponding value of its design life. By using this equation, or its graphical solution *(Graph 7)* the suitability of the proposed bearing size can be checked by a direct calculation of its life under given operating conditions.

It is important that the load and speed employed for design purposes be a reliable estimate of actual normal operating conditions and not include arbitrary factors of safety, nor be based on maximum loads. It should also be kept in mind that the estimate of life applies to actual hours of service, which need to be adjusted in terms of use in order to convert to years or other calendar periods.

In applying this procedure it is helpful to correlate the method with past experience by calculating the performance of known bearing applications, which have seen sufficient service to establish their replacement record.

Combined load is expressed as an equivalent radial load in estimating life. For this purpose the thrust component is multiplied by a coefficient 'Y' and the product added to the applied radial component. The coefficient 'Y' has the following values:

Single Row Groove Type Bearings

'Y' = 1.0 at low speed and relatively heavy load.

'Y' = 1.5 at high speed and light load.

Double Row Groove Type

'Y' = 1.1

Self-Aligning Type

2300 Series	Y = 1.5 — 2.0
2200 Series	Y = 2.0 — 3.0
1200 to 1208	Y = 2.5 —3.5
1209 to 1222	Y = 3.5 — 4.5
1300 to 1306	Y = 2.5 — 3.0
1307 to 1324	Y =3.5

The reference rating is based on the normal condition of inner race rotation. When the outer race rotates, or when the load rotates along with the inner race, the reference rating must be reduced to allow for the increased fatigue action. For self-aligning type the rating becomes 90% R, for other types 75% R.

The maximum load to be applied to any bearing should not exceed an amount equal to five times the reference rating value.

"Tool Engineers Turn To War Production" is Fall Meeting Theme

"Tool Engineers Turn to War Production" will be the theme of the Fall Meeting of the American Society of Tool Engineers which will be held in Toronto, Canada.

The Meeting will open Thursday, October 16 with plant tours throughout the day. Thursday Night the technical session will be upon the subject "Machine Tools for National Defense Production." Arnold Thompson will speak upon the subject "New Modern Machine Tools versus Used Machine Tools" giving a comparison of cost, accuracy of products, etc. The other speech will be on the "Utilization of Old Machine Tools on National Defense Work."

The technical session on Friday afternoon will deal with "Getting the Most out of Cutting Tools." Mr. R. I. Wise will speak at this symposium. The banquet will be held Friday evening.

Saturday morning there will be a technical session on "Training Personnel." Speakers will include Mr. R. M. Sherk and Mr. E. Kennard.

Arnold Thompson is General Chairman of the meeting. Other committee heads include E. Barker, Plant Visitations; A. B. Lawrason, Buses & Registration; F. Schytte, Entertainment; E. Wearn and R. Sherk, Technical Sessions; L. Singer, Reception; J. R. Bruce and L. Singer, Hotel Reservations; and H. Thorne, Outdoors (hunting, fishing, etc.).

Plant tours are being arranged which will include some of Canada's most important arms producing plants, and the Canadian Government at Ottawa is cooperating to the fullest extent in urging plant managers to extend every cooperation to the visiting Tool Engineers.

Curtiss-Wright Dedicates New Buffalo Plant

The new Buffalo plant of the Curtiss-Wright Corporation was dedicated on August 14, 1941. At the 34 acre plant bordering the Buffalo Municipal Airport, assembled representatives of government, including William S. Knudsen, of industry, and of the press.

They toured the plant first, found 6,500 of the eventual 12,500 men already at work, production well under way. (For a complete production story on the Curtiss Buffalo Plants see THE TOOL ENGINEER, August, 1941, p. 43.)

For an hour the production stopped while workmen and guests crowded the apron of the plant to listen to speeches, see a flag presented by the V. F. W. Then those in attendance saw a demonstration of the Tomahawk or P40, a pursuit plane which is seeing much service on the Egyptian and Far Eastern fronts.

They saw the new Kittyhawks, faster and leaner than its older brother, armed with six .50-caliber machine guns and with armor protection for the pilot. This new plane is powered with a new 1150 hp Allison engine which is smaller in size than the older 1050 engine used in the Tomahawks. This new engine gives the Kittyhawk a reputed top speed of better than 380 mph.

But the big moment of the dedication came when a new XP-46, an experimental plane that is the Curtiss bid for tomorrow, flew over the field. Although powered with one of the old 1050 hp Allisons the plane is intended for speeds above 400 mph. When it goes into production it will probably be powered with a newer still 1350 hp Allison, will perhaps have twice the fire power of the Kittyhawk.

Meantime, while experiments for tomorrow continue, the production of this year's fighters goes on at a rate which is headed toward the 500 a month mark. As the dedication ceremony ended and the machine tools in the plant came to life again, the guests knew that here was a remarkable record chalked up by the Defense Program: Field to Factory in 193 days.

Hand Hydraulics

How high pressure hydraulics has been developed and applied to tools which find many applications.

By KARL KUEHN

Blackhawk Mfg. Co., Milwaukee, Wisconsin

THE field of hydraulics is unbelievably large. Our discussion will pertain only to high-pressure hydraulics, by which is meant pressures from 3,000 to 10,000 pounds per square inch. By low pressure is meant any pressure of a thousand pounds or less per square inch.

To familiarize you with high-pressure hydraulics, I would like to start out by discussing one of the simplest and best known units, an hydraulic jack. Next, I will discuss special jacks, remote control units and various uses of these types. Hydraulic Jacks were invented 150 years ago, but it was not until after the last World War that they were produced in sizes small enough to be portable. It is from that date that the greatest development and progress were made.

Perhaps the most important thing that contributed to the popularity of hydraulic devices is their extremely high efficiency. This is from ninety to ninety-five per cent as compared with about thirty-five per cent for mechanical ratchet jacks and fifteen per cent for screw type jacks.

Before proceeding, I would like to define hydraulics. This is the science that deals with oil or other fluid in motion. Hydrostatics is the science that treats of pressure and equilibrium of liquids such as oil, water, or other fluids. Theoretically, oil in the hydrostatic jack is in motion but in the strictest sense of the term, it is not because the motion is merely a transfer of power. Hence, it is a fact that the hydraulic jack is misnamed, but since it is universally known as such it will be used in all further references.

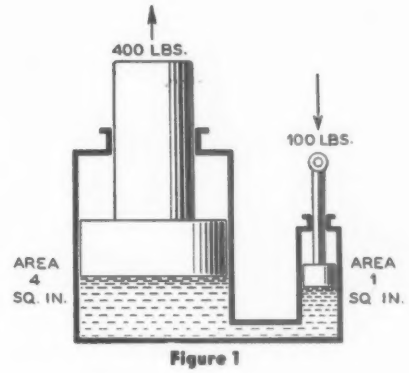


Figure 1

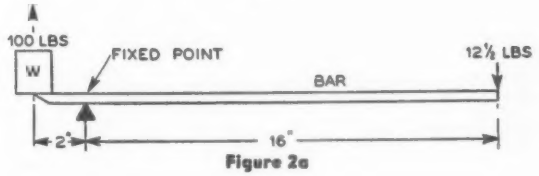
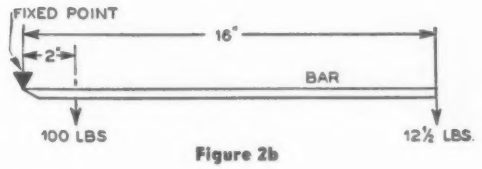


Figure 2a



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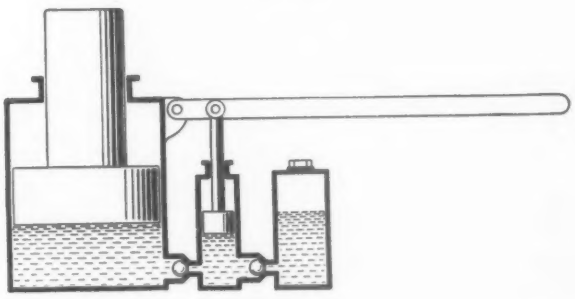

Figure 3

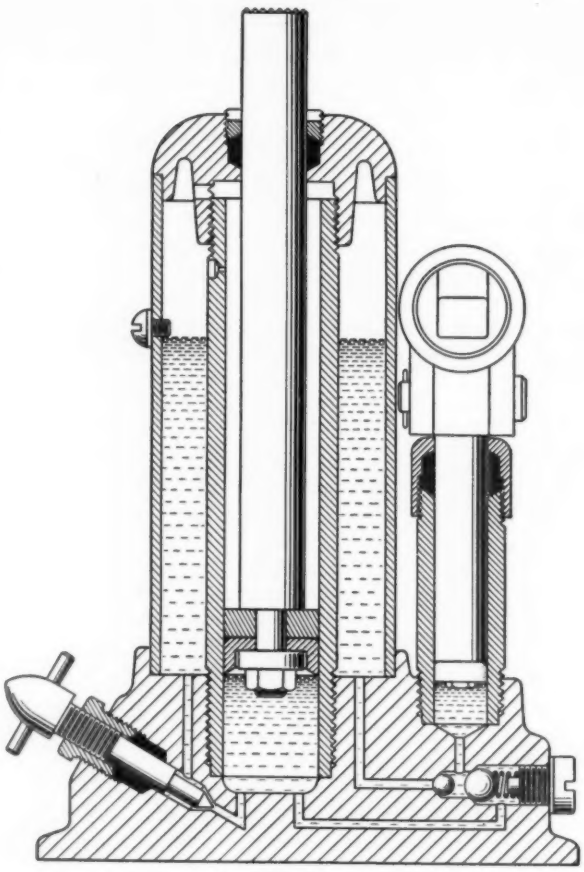

Figure 4

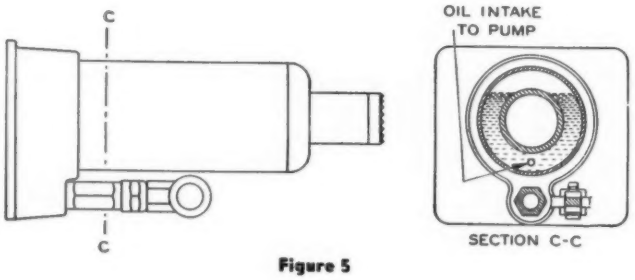

Figure 5

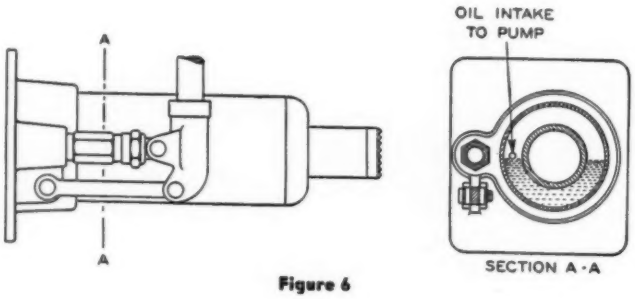

Figure 6

An example of a truly hydraulic unit is the turbine. The liquid that motivates it, actually moves through the turbine, performs work due to the motion of the liquid and then passes on.

To properly understand the action of an hydraulic jack and the various controls and units, which are variations of the jack, it will be interesting to analyze the simple principles underlying their action.

The Hydraulic Ratio

Figure 1 is an illustration of two cylinders and plungers of different areas. The cylinders are partially filled with oil and connected with a common channel. It is evident that to press down with a given force, say one hundred pounds, will result in a lifting force four times as great in the larger cylinder since the area of the larger is four times that of the smaller. However, the large plunger will be raised but one-fourth the distance. Liquids under pressure are practically incompressible, thus their action will be treated the same as that of a solid.

In addition to the hydraulic ratio, which is obtained in an hydraulic jack there is also a mechanical advantage.

The illustration (*Figure 2*) shows the simplest possible explanation which is that of a crowbar used on a pivot point. The mechanical ratio here is eight to one.

Adding the diagrams, you have the combined advantage obtained by the use of mechanical and hydraulic means. It is now evident that a force of 12½ pounds will be capable of lifting a load of 400 pounds *(Figure 3)*.

Obviously, valves are required since in their absence any pressure on the small column of oil would have its effect only so long as the pressure was maintained. With the pressure removed from the small column of oil, no work could be done as there is nothing to retain the oil in the larger cylinder. The common valves used in hydraulic jacks are perfectly round, steel balls, since they have a tendency to seat themselves quickly. One must be used for the intake of oil and another for the discharge of oil.

A modern hydraulic jack is shown in *Figure 4*, and upon examination you will note an outer cylinder which acts as a reservoir for the oil, an inner cylinder which is a pressure cylinder, a base to accommodate the various passages for the oil, a main plunger, a

top cap to hold the complete unit together and the accessory parts such as the pump, pump piston, release valve, etc. As the pump piston is raised, the oil is withdrawn from the reservoir lifting the intake check valve and filling the pump cylinder. On the down stroke of the pump piston, the intake valve is seated by the pressure of the pump piston and the discharge valve is forced off its seat so that the oil can pass under pressure into the large pressure cylinder, thus raising the main plunger. Repeated strokes raise the plunger to its full height.

To lower the load, the release valve is opened thus permitting the oil in the inner cylinder to return to the reservoir.

Hydraulic jacks can be used horizontally, if the pump is in proper position to draw oil. *Figure 5* shows a jack properly placed. The pump is on the lower side as is the oil intake. If the pump is on the side *(Figure 6)* only a portion of the oil can be withdrawn from the reservoir and as a result only a partial stroke will be possible. *Figure 7* shows how the standard hydraulic jack can be converted into an inverted type of jack by the addition of a copper tube of proper length screwed into the oil intake hole.

Remote Control Uses

Figure 8 is a schematic illustration of a remote control hydraulic system. You will notice that the pump in the upper half of the picture has many of the same parts as the jack. These are a reservoir for the oil, the intake and discharge check balls, a pump plunger, and a release valve. The lift ram is connected to this pump by means of a high-pressure hose. This hose, by the way, has a burst pressure of approximately 20,000 pounds per square inch and a working pressure of 10,000 pounds per square inch. The inside diameter of the hose is 7/32", and the outside diameter is 5/8". The inside tube is of oil resistant rubber and is supported by double layers of wire braid. There is a tough rubber cover to prevent damage.

There are several distinct advantages in using remote control equipment. Chief among these is the fact that the lift ram can be used in any plane. This is evident from the fact that the pump will usually remain in

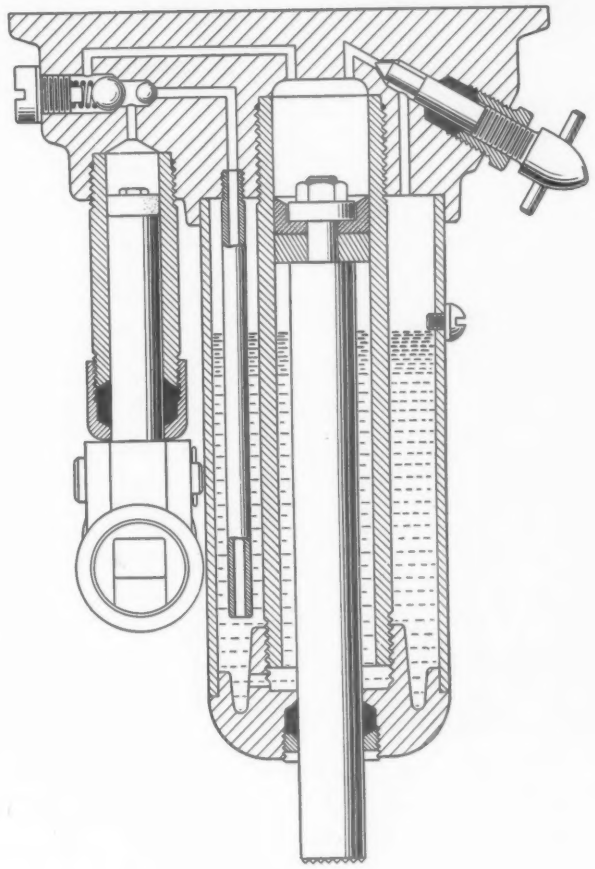

Figure 7

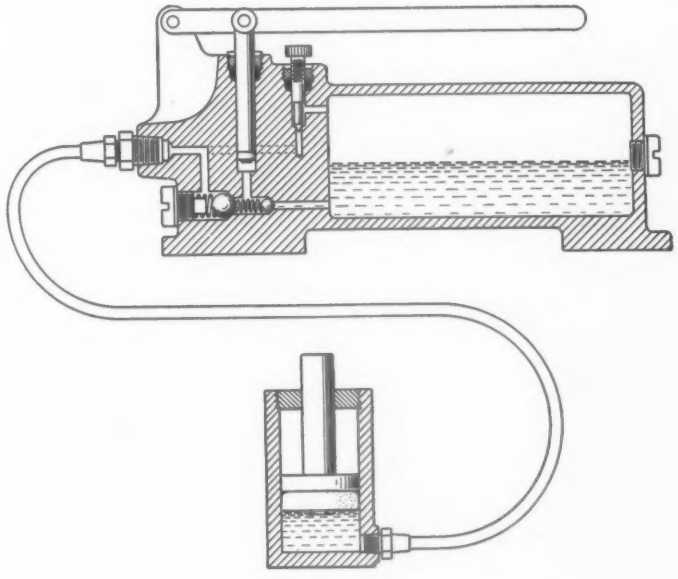

Figure 8

the same position. Also, a twenty-ton ram weighs only twenty-two pounds, whereas a twenty-ton self-contained jack weighs approximately fifty pounds. Further than this it is much safer to use remote control equipment since the operator can be six or eight feet from the load that is being lifted.

A commercial product along these lines has been developed, and includes rams which vary in capacity from four to fifty tons and in size from a tiny ram of 1⅝" diameter and 1⅝" high to one 5" in diameter and 13" high. Many special attachments have been made which convert the unit into a press, a "C" clamp, lift jack, toe-lift jack, and enable the operator to do spreading, bending, and clamping operations. It was developed primarily for use in rebuilding damaged automobiles and trucks, but has since found use in plant maintenance departments and in construction work of all kinds.

Uses of Hydraulic Tools

Another field in which hydraulic jacks and remote control systems are successfully employed is as part of machines such as road-graders, lift-trucks, and other materials handling equipment, snowplows, and many kinds of special applications. Among the types of lift-rams used are single-acting or push rams, double-acting or push-pull rams and telescopic rams. The effective area on the pull side of a double-acting ram is considerably less than the effective area of the push side, because of the presence of the plunger.

The telescopic ram is used in cases where the space is limited and a comparatively long stroke is required.

An example of an hydraulic tool is a special cable-splicing press. Cables to be spliced are pushed into either end of a lead sleeve, and by means of the tool a deep crimp is put into the sleeve thus splicing the cables together. This is only one of a number of tools now being made and these tools are but forerunners of many more to come.

The use of hydraulic equipment, both hand and power operated, is in its infancy, and I hope these facts will be of aid to Tool Engineers in their future work as it will enable them to better consider this type of mechanism.

Are You Getting The Most Out of Your Cutting Tools?

By EUGENE I. WHITING

WITH new Government restrictions on the use of high speed steel in order to conserve tungsten, it behooves every user of small tools to give serious thought to improving the life and cutting efficiency of his present supply of milling cutters, end mills, reamers, drills and so forth. Whether a cutter stands up for a long time between regrinds and produces a smooth and accurate surface depends largely upon the manner in which it was reground.

For years it has been standard practice to resharpen various kinds of high speed steel cutters with abrasive wheels of 46 or 60 grit. To be sure, in the hands of a skilled tool grinder hand, a 60 grit aluminous vitrified wheel will do an accurate grinding job and leave a fairly keen cutting edge on each tooth. However, if the cutting edges of, say, a milling cutter or a reamer, as commonly ground with a 46 or 60 grit wheel, are examined under a powerful glass, a saw tooth edge with its characteristic peaks and valleys is at once evident.

In addition to a weak cutting edge and comparatively rough surface on the two faces that form the cutting edge, frequently the teeth of such a milling cutter or end mill are not all of exactly the same height. In such a case, the highest tooth is doing most of the cutting and, of course, under the excessive load imposed upon it, the tooth will break down rapidly.

There has also been a tendency to minimize the seriousness of burning the cutter teeth in the process of resharpening. Since most cutter grinding is done dry, it is necessary that the grinding wheel be of a soft grade to insure a free and cool cutting action, and that light cuts be taken with it.

Proper Sharpening

Emphasis should be placed not so much on how many cutters an operator can regrind in a day as on how many cutters, *properly sharpened*, that is with keen cutting edges, correct clearance angles and all teeth of uniform height.

The number of parts produced per regrind and the number of regrinds in the life of the cutter provide a measurement of the quality of the sharpening operations. For example, at our plant it was the practice to regrind 6" heavy duty end mills with a 60 grit grade J aluminous vitrified wheel. No particular effort was made to obtain very keen cutting edges on the teeth and the outside corners were left sharp. As a result, the cutters would stand up only one to three days before they had to be reground.

The trouble was corrected by using a 60 grit aluminous vitrified wheel one grade softer (I) for rough grinding the cutters and then follow up with a very fine grit shellac bonded wheel for finish grinding. In addition, the outside corners of the teeth were rounded slightly by hand stoning.

Cutters ground in this manner had uniform tooth height, the cutting edges presented a sharp, unbroken line and there was not the slightest evidence of burning. When these cutters were placed in use, they gave as much as eight days service before requiring regrinding. Moreover, the work produced had a better finish.

In order to grind the cutters in the manner described, namely, with keen cutting edges, high surface finish and uniform tooth height, only about 25% more time is required than to grind them in the ordinary manner with a single 46 or 60 grit wheel. Moreover, such cutters when they are returned for resharpening, invariably require less stock to be removed since the wear has been distributed uniformly among all the teeth. This is reflected in increased overall life of the cutter. Of course, it is necessary that the operator also exercise good judgment and not continue to use a cutter until the edges are broken down entirely. If a cutter is reground before extreme dullness is reached, say, 90% of the maximum number of parts per grind—then it should be necessary to grind off only a very small amount of the tooth on each grind, thereby prolonging the tool life.

Taking a little more care and time to regrind your cutters properly to insure keen and durable cutting edges, uniform tooth height and freedom from heat checks or cracks, pays handsome dividends.

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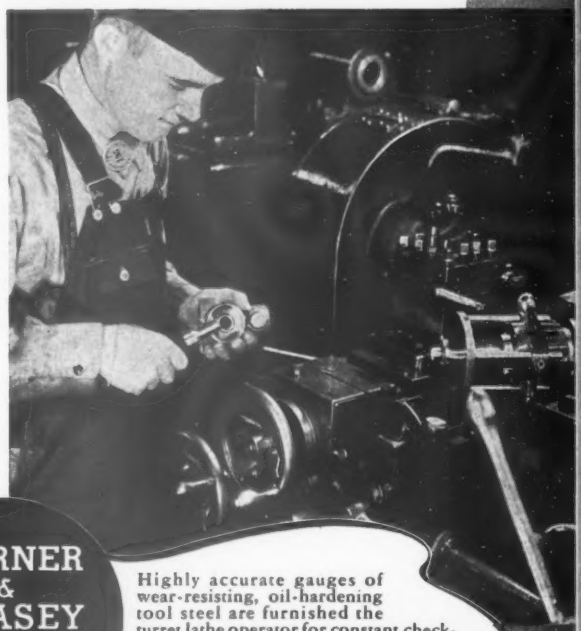

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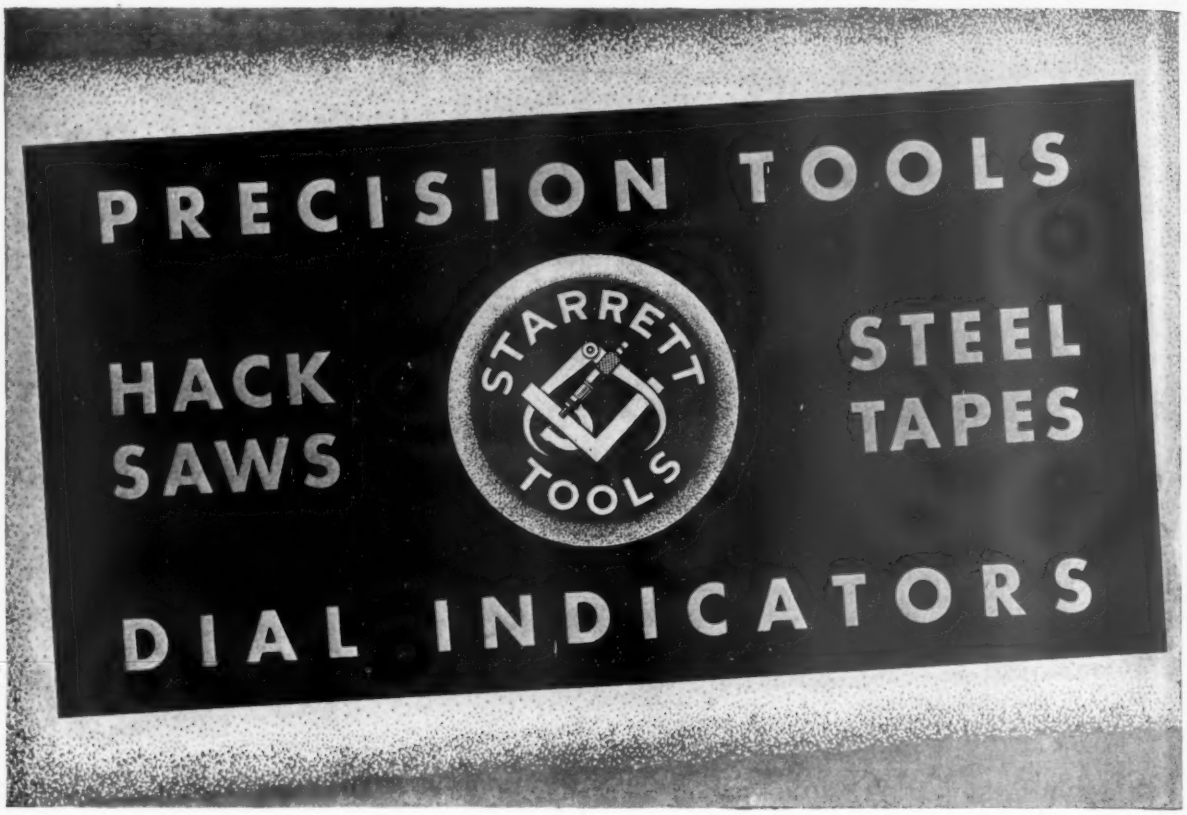

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Technology and Industrial Drafting

In these perilous times we need to cut industrial training programs short; need to give men practical training in college. A good starting place for the teaching of technology is in Industrial Drafting.

By H. C. BAYLISS

PRESIDENT Alexander G. Ruthven in his 1939-40 personal report to the Regents of the University of Michigan, said: "State Universities have rather consistently ignored the importance of frequent stock-taking of results and reviews of objectives. As a result, like many other social agencies, our schools have tended, as a group, to become static, wedded to tradition, to operate as if they existed largely for the benefit of their own staffs and to get out of touch with major conditions in the present day environment." I do not know whether this criticism is any more palatable coming from a University President than from a layman. As a former teacher of Drafting, I am sympathetic to the difficulties faced, standing between students and school administration, and trying to achieve ideal results.

I have not had the time to make any extensive survey of the results being achieved by our Engineering and Technical Schools, but along the line of stock-taking and in an attempt to explain in some measure why Industry has adopted a certain definite attitude toward graduates, I would like to cite two case histories from my personal experience.

Homer C. Bayliss

Mr. Bayliss is well schooled in the practical phases of Tool Engineering, having worked in the shop as an apprentice, through engineering school, and finally to teaching and lecturing on engineering subjects.

Production Tied Up

Twenty-three years ago, during World War No. 1, I was suddenly detached from service in Washington and sent to Detroit by the Ordnance Department to straighten out a mess that had tied up production on anti-aircraft guns. The situation in Detroit was so bad that the prime contractor had gone to Washington and endeavored to throw up his contract because he claimed it was impossible for him to get any production with the type of unreasonable inspection being imposed upon him by the Ordnance Department. When I arrived in Detroit, I found a mountain of 3" guns in various stages of completion, racked up like cordwood in the center of the shop floor. All of them had been rejected by the inspector for various reasons. The pile represented a year's work and the management of the factory was receiving a daily cablegram from General Pershing at Chaumont, urging all haste, as anti-aircraft guns were vitally needed to defend American troops in France.

I discovered that slightly over a third of the gun barrels had been rejected because of certain lines or scratches which appeared longitudinally on the periphery of the barrels and these had been interpreted by the Inspector to be indications of fissures or defective forgings. A cursory survey revealed them to be merely scratches caused by the dragging of a chip from the turnings as the tube or sleeve was being lifted from the lathe.

Another third of the rejections was caused by the decision of the inspector that a breech block latch pad was not machined to proper limits.

On that particular design of 3" anti-aircraft gun there was a latch pad approximately 2" wide, 5" long —and an inch thick at the thinnest point. All of the dimensions of the drawing were shown in fractions, without any tolerances being indicated. The Army Inspector of Ordnance notified the gun manufacturer that when fractional dimensions were shown on drawings, the accepted tolerances were plus or minus .0001" and that the guns were rejected because this latch pad did not meet these specifications. He refused to budge from his position, in spite of the fact that it was called to his attention that his interpretation was not standard manufacturing practice and that furthermore the latch pad fitted the air and was covered with a coat of paint after the gun was assembled.

My object in telling this story is the fact that the Army Inspector of Ordnance who caused the trouble was a Junior lifted from one of the famous Engineering Schools of the East, and, due to the emergency, was given a Second Lieutenant's Commission and sent out to handle all of the inspection connected with the manufacture of that vital necessity—3" anti-aircraft guns.

I am willing to concede that this was one of the worst cases which came to my attention during the last War, but ignorance regarding manufactur-

ing methods and common shop practice was by no means confined to this exaggerated case and unfortunately stories are drifting in to me regarding our present Defense Program, which indicates that contractors are still having their troubles with the problem of ignorance.

An Industrial Assignment

My second case history concerns a young man who would have graduated from one of our Middle Western Universities, this June, if he had not become imbued with the desire to be an aviator. He dropped out of school and was admitted to Randolph Field and at the end of his instruction period was rejected because his eyes failed to coordinate within the required time limit after being in a tail-spin. Being supersensitive over his failure to pass his Cadetship, he refused to go back to the University, but secured a job in one of our Detroit factories. The Employment Manager, after a cursory inspection of his drawings, assigned him to the Tool Design Department. When he reported for work the following morning, he was given a drawing table and was handed a part casting, with instructions to report to Department D-47, where there was available a surplus Single Spindle 3" Drill Press. For this, he was to design a Multiple Spindle Drill Head as well as a fixture for holding the part, so that all the holes could be drilled simultaneously.

I wonder what percentage of men who have finished three years of Engineering School work would be able to competently handle such an assignment as that?

What Can Industry Expect?

This naturally brings up the question as to what is a fair standard of knowledge which Industry has a right to expect from Engineering graduates. Management does not spend a great amount of time criticizing the output of our Universities. Their real attitude toward the college graduate is revealed by the fact that in the vast majority of shops throughout the country, each yearly intake of college graduates is put into the shop for anywhere from a year and a half to two years' training in manufacturing methods, before the college graduate gets his foot on the first rung of the ladder which leads on and up from the worker at hourly wage rates—toward the specialty for which he trained by attending the University. Engineering graduates have come to accept this shop tenure as something akin to the interneship of the Medical School graduate.

Training a Nuisance

In peace-time no one complains very much about this special apprenticeship duty, except the graduate who is rather anxious to get married. During an emergency like we are in at the present time, this supplementary training by Industry of the college graduate becomes a nuisance because Management needs Tool Engineers and competent production supervisors to meet the demands of an enormously expanding personnel and production.

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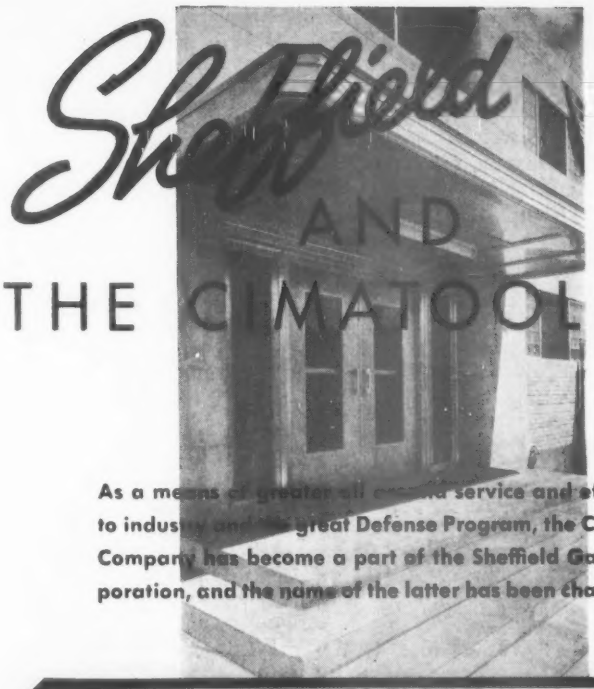
fact that they have been able to devise intensive methods of instruction which cuts training time down from two years—to nine months. A recent report from the Glenn L. Martin plant describes their school for graduate engineers in the following words: "Recruited from all over the country—young engineers with the ink scarcely dry on their diplomas come to Baltimore—where in a downtown building they attend an intensive course for six weeks. The purpose of this course is to teach them as much as possible about the specific problems in aircraft building which they will encounter at Martin's. Salaries start when the training begins and the men turn out simple drawings and do other elemental work while learning. The course completed—the men go to the plant—where they put on overalls and go to work, rotating from operation to operation, until they have had considerable actual shop experience. This continues for nine months—after which time the young engineer knows considerable about actual work in the shop, because he has operated many different machines and learned many different operations. He is more than a theoretician."

This reduction in the time allotment for the special apprentice course for college graduates from a year and a half or two years to—nine months, shows what can be accomplished when experienced thinking approaches the problem. You will note that the contribution has been made by Industry. I believe that with inspired teaching doing its part the shop interneship can be still further reduced in time.

Less Time on Manual Work

Undoubtedly all Departments of the Engineering School could improve their work by relating it more definitely to the needs and conditions of today, but the greatest contribution can be made in the Drafting Room where the fundamentals of drawing are taught. I believe that the amount of time spent in instruction on the manual part of making a working drawing can be reduced considerably from the average now prevailing in University Drawing Rooms. An astonishingly small number of hours is really required for a student to learn the minimum number of views and



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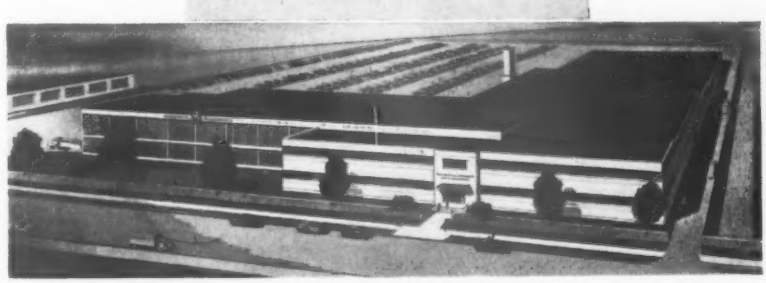

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proper location in order to properly depict a part. Furthermore, there is no reason—while he is learning to improve his technique, that he cannot work definitely along the lines followed universally by the Drafting Rooms of Industry. The student should be taught from the very beginning—that the Drawing is the liaison between the brain of the engineer and the product in the hand of the customer. Perhaps he will be more impressed with the importance of drawings in Industry if he is told that it takes thirty tons of blueprints for the construction of a first line battleship.

I do not wish to incur the wrath of the publishing companies but nevertheless I do not believe any great hardship would be worked if there were no text books on Engineering Drawing. The elimination of text books would allow the teacher of drawing to teach Technology as the course proceeds and the men improve their drawing technique. If the student is handed an object or a casting instead of a lesson sheet to copy, he will be dealing with a situation which he will meet in industrial life later, and naturally, being accustomed to it, will be better able to cope with it when making good on the job is of prime importance. If the parts to be drawn up increase in difficulty and complication, as the course proceeds, you will find it easier to reiterate the fundamental law of drawing which never must be forgotten; namely, "Make all drawings clear and complete, so that the object represented can be made without any other instructions than those contained in the drawing itself."

One Certain Method

Allied to that fundamental law there are five important additional principles that will help the student visualize the function of the working drawing. (See Table I)

TABLE I

1. Do not crowd details.
2. Show as many views as necessary to make the object represented clearly understood.
3. Cross sections are preferable to visionary lines.
4. Show the object in detail drawing in the same position as shown in the assembly drawing.
5. Holding up work while some point in design is made clear or a missing dimension is added—must be avoided.

There is one certain method any drawing teacher can adopt which will impress the last principle on a student's mind. If, as soon as the student learns the proper location of views on a working drawing—he is sent into a shop some distance from the drawing room, equipped only with a pad and a scale, and a pencil—and is told to make a sketch of a part and then return to the drafting room and make a working drawing from his sketch; he will find out the importance of getting all dimensions while he is in the field—otherwise he will have many a weary trek back to pick up an essential dimension that has been overlooked. Some instructors in drawing may be tempted to say that they are handicapped at their schools by the fact that no shop is part of the school equipment. Let me say it strictly between ourselves—instead of a handicap — that is probably an asset! Most school shops have as little similarity to the production

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Send coupon to Joseph T. Ryerson & Son, Inc. Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Boston, Buffalo, Philadelphia, Jersey City.

TWO MONTHS MORE WAITING FOR THOSE TRIMMING DIES 'N BILL WILL BE A SWELL FLUTE-PLAYER
NEW DROP PRESS WILL BE SET UP HERE
WHEN, AS AND IF....

Is "Waiting For Big Machines" Stifling Your Production?

CUT UP TO 18 GAUGE hot rolled steel with "Mighty Midget". Easy to handle as a pair of snips. Eliminate costly and hard-to-get trimming dies and patterns with Stanley Unishears.

UP TO 12 GAUGE with this big capacity No. 144A Portable. Large sheets can be cut and trimmed, turned up edges cut off close to the surface. Carrying the tool to the work saves time and expense.

MANY of the trimming and sheet metal cutting jobs now done with expensive dies can be worked through your plant accurately and quickly with Stanley Unishears. 8 models – both portable and stationary types – give you capacity range from 18 up to 10 U. S. gauge hot rolled steel, as fast as you feed.

There are many other cost-cutting Stanley Electric Tools: Toolroom, Contour, Bench and Heavy Portable Grinders; Electric Hammers, Drills, Screw Drivers and Saws. Don't just "wait" for big machines; ask your Stanley distributor for a demonstration of how these tools can boost production, right now, or write for literature. Stanley Elec. Tool Div., The Stanley Works, 149 Elm Street, New Britain, Conn.

STANLEY
Electric Tools
A Complete Line for Industry

UP TO 16 GAUGE steel with No. 16A shown above. Cuts straight lines, curves, angles, notches. Feeds up to 15′ a minute. All Stanley Unishears are 100% safe.

STANLEY UNISHEAR No. 0-54. Cuts inside holes or shapes without "starting holes"; cuts curves to less than ¼" radius. Its 54" throat handles sheets up to 9 feet in diameter. Two other "0" models–depth of throat: 15" and 36".

shops of industry as a horse has to an automobile. If the interest on the investment and the operating cost of school shops were turned over to the teachers of drawing for field work in Industry during vacation periods, a great step would be taken in improving the student's knowledge of modern Technology.

21 Points Required

I really am sincere in feeling that the Instructor in Engineering Drafting is the proper place to begin instructing the student in Technology. It is not a natural function of the lecturer on machine design, although most of them could brighten up their material a bit with some practical illustrations. It is not a natural function of the instructor in machine shop practice—unless that instructor is not handicapped with a shop.

Take a look at the 21 points which Checkers of drawings in a large Tool Design Department must answer when going over completed work of the draftsmen (Table II).

TABLE II

1. Is the principle of design correct? Does it handle the operation properly?
2. Is the cost of operation as low as possible?
3. Should operation be handled independently, or should it be incorporated in another?
4. Is the machine selected for the operation adapted and strong enough for the work?
5. Will the tool fit the machine?
6. Will the part go into jig or fixture?
7. Are the clamps properly located? Quick acting? Adjustable? Will they distort the work?
8. Is there sufficient travel in spindle and ways of machine to take care of work?
9. Is the appearance and general design of the casting correct? Have the proper relative proportions and metal thicknesses been used?
10. Are locating surfaces properly located?
11. Do the dimensions on adjacent parts agree?
12. Are there any interferences?
13. Is the tool easily assembled and dismantled? Are all wearing parts adjustable and easily replaced?
14. Has provision been made for chip clearance and removal?
15. Is the proper lubrication given to all moving parts?
16. Has proper heat treatment been chosen for the part? (When in doubt, refer to the Metallurgical Laboratory.)
17. Can the machining of any part be simplified?
18. Are all machined surfaces readily accessible?
19. Are standard parts used wherever possible?
20. Are safety rules observed?
21. Are hardened wear plates and linear bushings provided?

If these 21 points were enlarged and hung in a prominent place where they would be visible at all times from every drawing board in the School Drafting Rooms, I am sure that they would not only impress upon the student the relationship between the Drafting Room and Shop, but will give the instructor thousands of opportunities to instruct the men in the Technology of Modern Industry.

In addition to the 21 points covering design, the Checker has to satisfy himself affirmatively on the ten points shown in Table III.

It is my idea that school drafting rooms should make every drawing pass these requirements. Then the instructor will have an opportunity to impress his students in unforgettable fashion on such matters as the difference between limits, tolerance and allowances; that every student graduating from that instructor will know the difference between milling, planing, shaping and coining, as well as the fine distinctions between grinding, diamond turning, lapping, honing and superfinishing. I would like to see the walls of drawing rooms covered with enlargements of photos of pro-

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Gairing counterbores, countersinks, back spotfacers and core drills, (cutters, holders and complete assemblies) are supplied in high speed interchangeable, solid, adjustable and inserted blade types. Large stocks available. Special sizes to order. Our modern facilities are backed by a quarter century of specialized experience. Make use of them.
Gairing
TOOLS
The GAIRING TOOL CO., Detroit, Michigan
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SPECIALISTS IN FINE CUTTING TOOLS FOR 24 YEARS

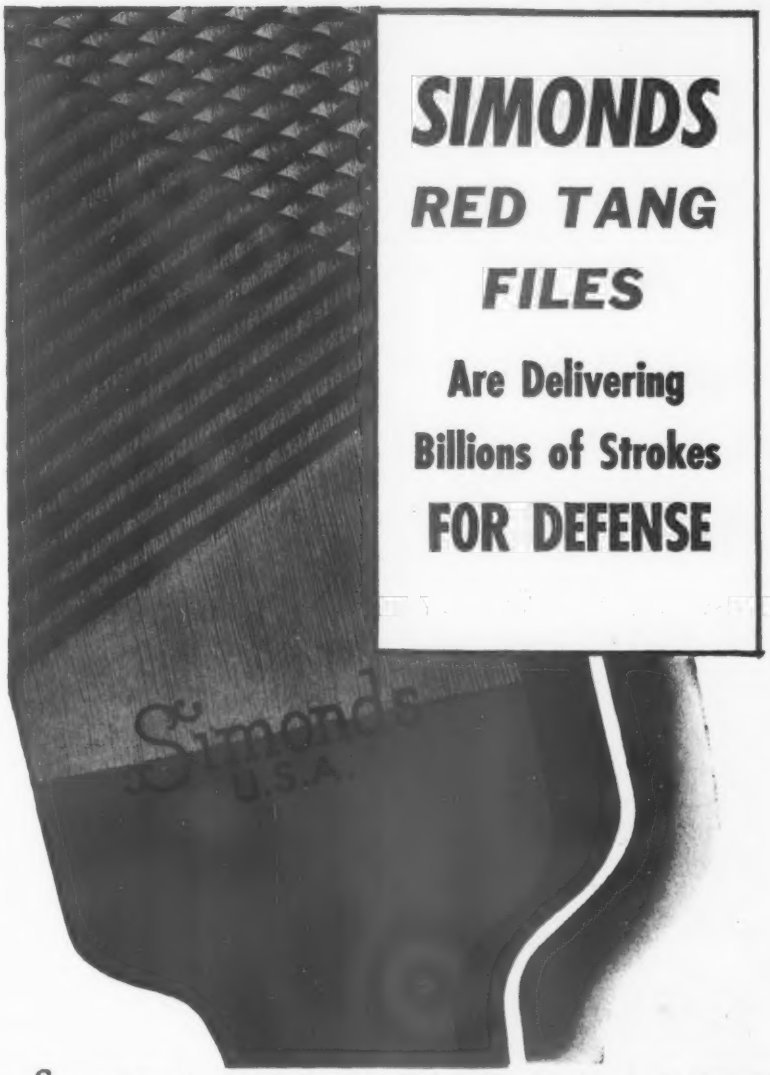
duction machinery as well as shellacked drawings from Industry, showing product as well as fixture and tool design. With an inspiring instructor this makes an ideal setting for arousing in a student the importance of his task. It will awake in him a dynamic mood of inquiry that will make him eager to contact his instructor and school himself for an interesting place in the work of the world.

It is well nigh impossible to approach any man who has had university training, and not find that he remembers some one teacher, at least, who awakened in him a yearning for more knowledge and who inspired him to hurdle the difficulties necessary to achieve success in his chosen life work.

TABLE III

1. Has the proper sheet size been used?
2. Is the title complete and clear?
3. Is the drawing clear, neat and thorough?
4. Have the proper lines, lettering, dimensions, abbreviations and limits been used?
5. Are all finish and grind marks shown?
6. Are all dimensions that are not to scale underlined?
7. When tolerance is necessary, has the proper allowance for fit been specified?
8. Have sufficient views been shown to clarify the object?
9. Are standard threads used?
10. Are centers shown on ground parts?

I think of all teachers as having that ambition and it is pathetic when diverse conditions cause that flame to flicker and die and teaching becomes a dreary daily chore. A recent acquaintance of mine, who is Vice President of a large industry in Detroit, told me about an interview he had with the head of a European Technical Institute, where he had gone to do some research work and get a Doctor's degree. When making the usual proforma call upon the Dean, my American friend was asked the question "Under whom did you study in America?" He replied: "Oh, I studied at Purdue, and Chicago and Johns Hopkins", but the dean replied: "Undoubtedly, there are many schools in America, but under "whom" did you study?" In desperation he blurted out the name of his favorite teacher at Purdue and was delighted to see the light of recognition show in the Dean's countenance, indicating satisfaction with that student's preparation. Not where—but under "whom" is important: Not buildings — but personality is what counts.



Scores of metal-working plants, in the forefront of defense work, depend on Simonds Red Tangs to make every file-stroke count. For Red Tang Files have teeth like the big metal-cutting saws . . . teeth that remove more metal with less "elbow-grease" and stay sharp far longer. Red Tang quality is under Simonds control from steel to shipping platform. All files are repeatedly inspected and tested for proper cut and hardness, uniform length of life. So, for *"the finest file—by a mile"* . . . buy Simonds Red Tang.

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...We Call it "The BEST WAY" to get both

"WC_2" chemists call it in the laboratory . . . in the shop we call it tungsten carbide . . . and when high production and finish are essential in machining operations, we call it *The Best Way* to get such results.

But tungsten carbide alone is not sufficient, it must be backed up by a machine specifically designed for its use like a Heald Bore-Matic. A machine with extremely rigid construction throughout, velvet smooth hydraulic table control, force feed lubrication to table ways, ample flat and V ways for stabilized table travel, smooth, powerful V belt drive to boring head, super-precision bearings, with automatic pre-loading in boring heads.

Heald Bore-Matics have all the above features and many more. They will precision bore — face — turn — will groove, etc., in fact perform nearly all precision operations individually or in multiple.

May we send you installation photos of Bore-Matics working in your own industry. Your name and address is all we need.

ACCURACY *and* FINISH *Economically*

Above a Heald No. 48A is boring both ends of a bronze bushed airplane articulating rod. Accurate to .0001 for roundness and straightness and finish measures 7 micro inches R.M.S.

The HEALD Machine Co., Worcester, Mass

Production Perspectives

News of Mass Manufacturing Everywhere

A REPORT on machine tool shipments shows that for the vacation month of July they totaled $57,900,000 against $63,000,000 in June and $60,800,000 for May. The total was, however, well ahead of the $31,500,000 figure for July, 1940.

A 3.1 per cent increase in weekly earnings of employes in manufacturing industries during the month ended June 15 was reported Aug. 16 at Washington by Secretary of Labor, Perkins. She reported a rise of six-tenths of 1 per cent in the cost of living in the 30 days ending July 15. Overtime work, she said, played a big part in boosting the weekly wages to an average of $31.84, although wage increases brought average hourly earnings up 1.8 per cent over May to 73.8 cents. The weekly earnings represented a 23.3 per cent advance since June, 1940.

The Office of Production Management on Aug. 17 at Washington proposed that the Maritime Commission construct an emergency fleet of 25 Great Lakes iron ore boats, at an estimated cost of $50,000,000. Production Director John D. Biggers told the commission the vessels would be needed to transport ore for the 6,508,950 tons of additional annual pig iron capacity which the OPM recently recommended. Biggers said in a letter to Maritime Commission Chairman Emory S. Land that "it is essential that the construction of these boats be completed at the earliest possible date," and he urged that "the highest possible preference ratings" be arranged for them. The OPM said that in event it approves a major over-all expansion of the steel industry such as it now is considering, an additional and larger ore boat program would be necessary. The 25 vessels would have a net carrying capacity of 12,000 to 13,000 long tons each. Their combined yearly capacity, on the basis of 30 trips per season, would be about 8,750,000 long tons or 9,800,000 net tons. They would be approximatetly 600 feet long and 60 feet wide. The OPM plans call for the fleet to be finished by the start of the 1943 navigation season.

The gigantic aluminum sheet mill under construction at Alcoa, Tenn., by the Aluminum Co. of America will go into production around Sept. 1, well ahead of schedule, an announcement by A. D. Huddleston, regional manager of the company, disclosed Aug. 18. Operations of the new plant, which will cover 60 acres and will be the world's largest single unit factory, are expected to reach capacity in about a year at which time more than 20,000,000 pounds of aluminum sheet will be turned out annually. Work on the project was started last November.

COMBINED gross revenues of 89 Class 1 railroads for July increased nearly 31 per cent over the corresponding 1940 month, the Association of American Railroads estimated Aug. 19 at Washington. The association placed aggregate gross of the 89 major carriers at $387,086,646, against $296,031,227 a year earlier, an increase of 30.8 per cent.

The Federal Reserve Board reported Aug. 19 at Washington that the high level of industrial production caused by the defense program had been maintained throughout July and first half of August. Board's seasonally adjusted index of production, however, rose from 157 in June to 162 in July. July was rated higher because in normal years industry slackens in that month. The July index figure, which represents a percentage of the 1935-39 average, compared with 121 in July, 1940. In July, the board said, automobile and steel production fell somewhat, but activity in the machinery, aircraft, ship building and lumber industries increased.

Reports from Detroit indicate that prices on 1942 model cars will be 15 to 20 per cent higher than those for the 1941 cars, including increased excise taxes now being studied. An estimated 10 per cent rise in the cost of manufacture also will be included.

Production for England's Royal Air Force of the first of a large number of Kittyhawk fighters, the export version of the United States Army's P-40 type, was announced Aug. 11 by Guy Vaughan, president of Curtiss-Wright Corp. They were described as being more highly streamlined than their

CONSUMER EFFECTS OF PRIORITY CONTROL

Drawn for THE TOOL ENGINEER by Ted Petok

"—him and his priority"

prototype, known as the R.A.F. Tomahawk. They develop 25 per cent more gun power.

A $50,000,000 expansion of facilities for production of steam turbines and gears for merchant ships was announced Aug. 14 by the Maritime Commission at Washington, to be financed under lease agreements by the Defense Plant Corp. The plants: Westinghouse Electric & Manufacturing Co., Lester, Pa., $22,000,000; General Electric Co., Erie, Pa., and West Lynn, Mass., $24,500,000; Allis-Chalmers Manufacturing Co., West Allis, Wis., $2,250,000; De Laval Steam Turbine Co., Trenton, N. J., $1,250,000.

Aircraft production continued its remarkable growth last month. The Federal Reserve Board Index of Aircraft Production reached a high of 994 (1935 - 1939 average equal 100) in July as compared with 878 for June. The index in July, 1940 was 394. All figures are adjusted for seasonal variation. Although production increased in June to 878 over 832 in May, there was a decrease in exports. (see graph)

A PLASTIC motor car body has been completed by the Ford Motor Company. It is designed to take advantage of the peculiar properties of plastics, but in appearance it is not radically different from conventional steel models. There are fewer deep drafts, though the body is as streamlined as its metal counterpart.

The only steel in the entire superstructure of the body is found in the tubular welded frame on which are mounted the 14 plastic panels that make up the unit. The total weight of all the panels is about 250 pounds and the metal frame has a similar weight. In all, the car with plastic body weighs about 2,000 pounds, while a steel unit of comparable size weighs approximately 3,000 pounds.

Company engineers said that no decision has been made as to what the standard power plant for the new model would be.

Even the windows and the windshield were of plastic, a composition used in the observation stations of modern bomber planes.

The new plant which the American Bosch Corporation is to build opposite its present factory in Springfield, Mass., is to be the first government owned defense plant of its kind in Western New England. Bosch now has more than 3,000 on its pay roll and ranks as the third largest factory in Springfield. When the new addition is opened, it is expected to go into second place as the Westinghouse factory has only 3,700 employed at present.

STIMULATED by defense production totaling millions of dollars, employment at the Van Norman Machine Tool Company, Springfield, Mass. Aug. 18, reached an all-time peak of 2,000 employes, James Y. Scott, president announced.

Employment in the metal industries has shown a steady gain during the past year and is expected to rise still further. The time is not far distant when it will reach a leveling off period in the opinion of Mr. Tulloch. Some firms have reached capacity production and do not intend to expand further. Others are rapidly bringing their production to capacity.

The Norton Company of Worcester, Mass., announces adoption of a retirement income plan, applicable to employes between 30 and 65 who have had five years' service with the company.

The program will provide participating employes with a regular monthly income, after retirement which will be in addition to benefits for which they will be eligible under the Social Security Act. A contract providing for the retirement annuities has been entered into with the John Hancock Mutual Life Insurance Co., the company announces.

While headlines tell of the triumphs of the major industrial corporations in arming the Nation's Army and Navy, little or nothing ever is said of the little manufacturer who, in his obscure way, turns out tools, machine parts and grinding wheels to keep the big machines going at full steam.

One of these is the John G. Sandstrom Company. Mr. Sandstrom started a few years ago to manufacture his own brand of grinding wheels, possessing unusual qualities. Orders came slowly at first, and usually were for only a few wheels from some of the many factories he supplied. But his little business has expanded with the war boom, and he has installed additional equipment to handle the increased orders.

Another company that has been doing yeoman work in turning out machine parts and tools for the big companies is the John W. Russell & Sons Company. Several machinists are kept busy continually turning out special machinery work. It was in this plant that the first automobile was manufactured.

There are many small firms in Springfield, Mass., hiring from a half dozen to 75 men, whose production efforts make it possible for the major industries to turn out a never-ending supply of defense goods, it was learned from A. R. Tulloch, assistant defense coordinator for the area.

New Building for Detroit College of Applied Science

THE Detroit College of Applied Science has just ended its 16th year of continuous year-around operation with the largest enrollment of its history.

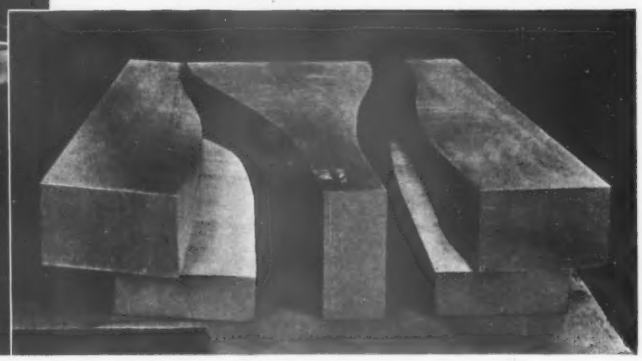
Preparing for an increased enrollment and normal growth the College has purchased land and is proceeding with plans for the erection of a new building. The building will provide space for the College's present activities plus necessary space for engineering subjects to be added to its curricula.

The mechanizing of warfare, in addition to peace time pursuits, has created a field for Tool Engineers and Production Engineers far surpassing the output of men trained in these professions.

The Detroit College of Applied Science has pioneered in the field of Tool Engineering and continues to lead in this newest and fastest growing branch of engineering.

The Ruthman Machinery Company has just moved into its new plant and office in Cincinnati, Ohio. "We have increased our output 25% during the first month in our new building; and during the second month we expect our output to go up to a 40% increase", says Mr. A. H. Ruthman, vice president of the concern.

METAL SAWING IS DUCK SOUP FOR THE DoAll



★ On the DoAll, the Hawthorne Metal Products Co., Detroit, Mich. cut the five sections of a die from one block of boiler plate steel 5" thick, 16" long, 14" wide — only 4 cuts of the saw necessary.

DO-ALL Contour Machine BAND SAWING BAND FILING BAND POLISHING

Time required on this job, only — 1¾ hours for each cut, or at the rate of ¼" per minute. Saw used — ½" 6 R.H. Speed — 150 f.p.m.

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The DoAll is the machine tool that is effecting unprecedented savings wherever installed, in machine shops, tool rooms, automobile and truck factories, railroad and aeroplane plants, arsenals and shipyards, etc.

The DoAll is an all-purpose machine—does internal and external band filing, sawing and polishing on any kind of metal or alloy. Handles work at various angles.

Let us send a factory trained man to your plant to show you how a DoAll will handle your cutting jobs.

FREE — Literature and 158-page Handbook on Contour Machining.

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Associated with the DoAll Company, Des Plaines, Ill., Manufacturers of Band Saws and Band Files for DoAll Contour Machines

DoAll GRINDER

A super precision surface grinder — a real production tool. Less vibration because motor is built right on the ball-bearing spindle. Work table has exceptionally large bearing surface. Hydraulic table travel is infinitely variable, up to 50 f.p.m.

Torque Tube Production

An unusual method developed by Tool Engineers at the Buick Plant for fabricating the steel flanges used on the ends of torque tubes.

TOOL ENGINEER'S ingenuity is reflected in a new method for fabricating steel flanges for the ends of torque tubes, developed at the Buick plant, Flint, Mich.

These flanges are used at either end of the torque tube, the one at the forward end being somewhat larger than that at the rear. In installation they are drilled and bolted to universal joints at the transmission end and at the differential end. Formerly, they were made on upsetters; the new system already has shown an appreciable improvement over the previous method. Essentially the present plan involves blanking disks from heavy gage strip, with a small hole in the center. This hole then is broached out slightly and the disk forced down over a steel ball, extruding the required collar on the flange for subsequent welding to the torque tube proper.

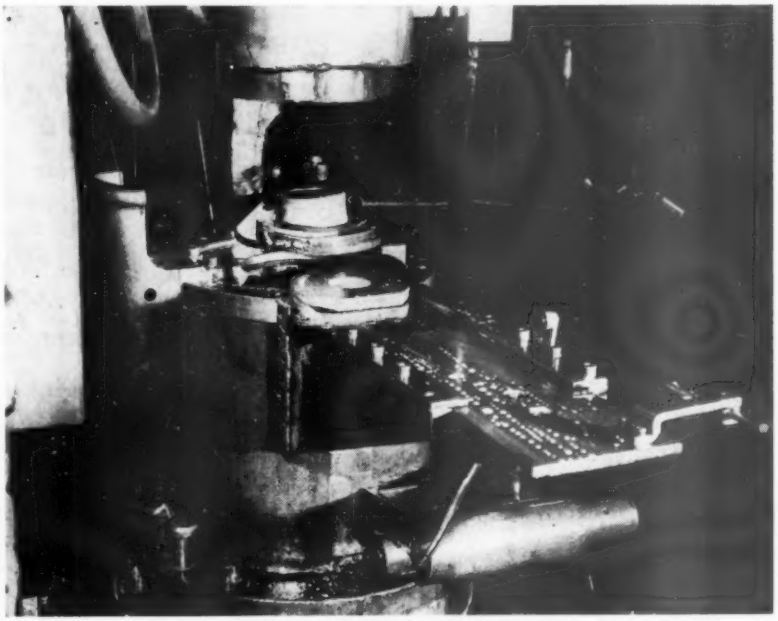
The larger flange is of 9/16-inch low-carbon steel stock, the blank being 6 inches in diameter and formed with a 1⅞-inch hole. They are blanked from strip stock on a 600-ton Clearing Press, after which the pieces are transferred to a 6-ton vertical American Broach which enlarges the hole to 2-inch diameter and gives a smooth inside surface. The disks then are placed, one at a time in a Williams & White 500-ton hydraulic press where by forcing the disk over a steel ball the hole is expanded to 3⅛ inches diameter and a 1⅜-inch collar extruded on the flange.

This is an interesting operation. The lower die of the press is cylindrical in shape, with a hole in the center large enough to permit passage of the steel ball which rests on a tool steel post cupped out at the top and setting inside the lower die on the pressure pad of the press. The upper die of the press also is cylindrical, having a cavity shaped with sufficient taper so that the formed collar is drawn down to ⅛-inch thickness at the top. Reason for tapering the collar in this way is to prevent the steel from opening up or cracking on the upper edge which occurred when it was attempted to make the outer surface of the collar parallel with the inside surface.

As the dies close to hold the blank firmly in position, and centered over the ball, they start to lower and the blank is forced slowly and smoothly over the steel ball which, after emerging from the top die rolls down a chute to one side. This chute accommodates four balls and feeds them one after another onto the center post, in position for the subsequent drawing operation.

Removal of Finished Part

As the dies open a swinging arm pivoted at the rear of the lower die moves in a horizontal plane to remove the formed piece from the dies. Movement of this arm is provided

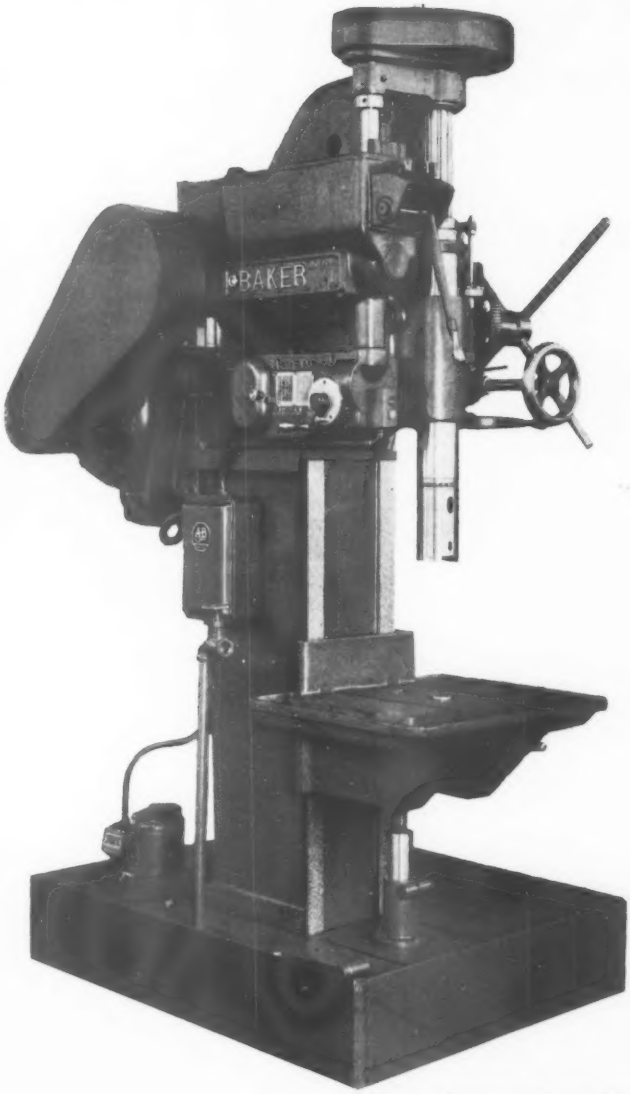


Williams and White Hydraulic Press

A swinging arm removes an extruded piece, while another is ready to slip in place.

Defense Work calls for Heavy Drills
The answer our new *Model 314A*

BAKER DRILLS



Capacity: Drill 3" dia. in solid steel.

Type: Universal Quick Change.

Geared Feed.

Features

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2. Speed Box Gears finished by shaving and "Fellows" Flame hardened.
3. Two piece Vertical Column design.

Ideal for Tank parts, Aircraft Engine and Landing Gear parts, and Gun Mount parts.

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BAKER BROTHERS, INC., TOLEDO, OHIO, U.S.A.

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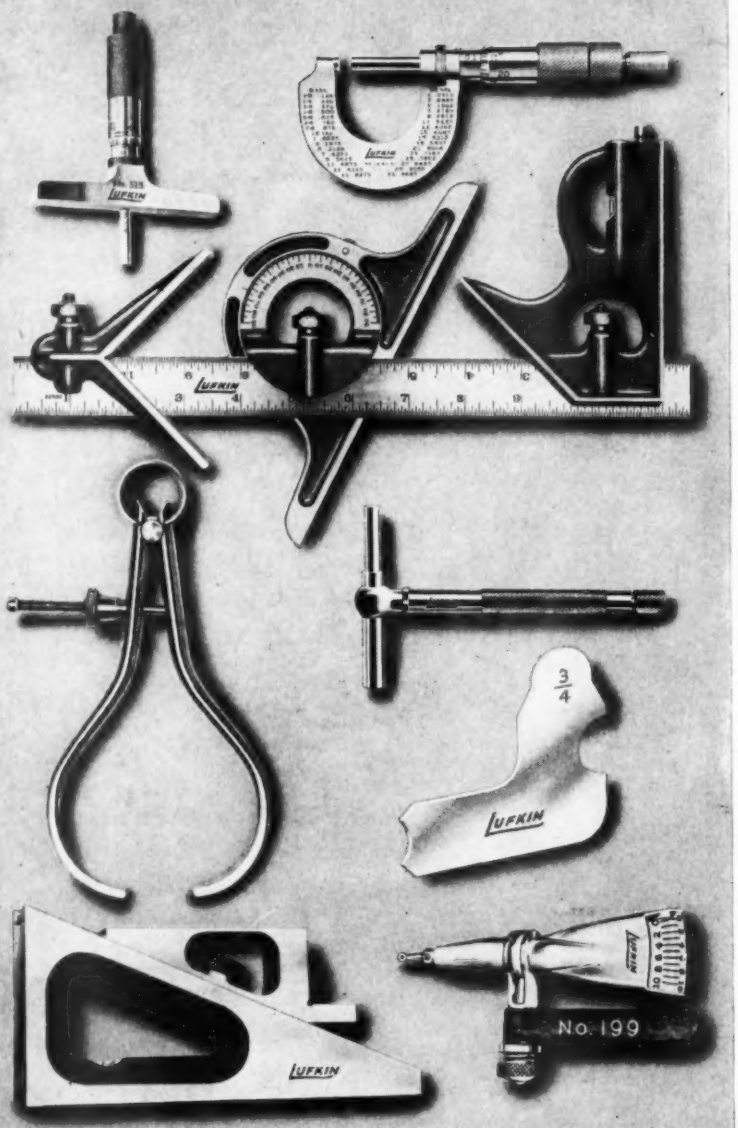
FOR FINE WORKMANSHIP



There's something about Lufkin Precision Tools that appeals to mechanics who take real pride in their work. Perhaps it has its roots in the downright good workmanship that's put into them in the first place. At any rate—it isn't hard to find —and your dealer will be glad to show you.

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TAPES — RULES — PRECISION TOOLS

through a vertical cam rail bolted to the press frame against which one end of the swinging arm bears.

Travel of the press ram is 15 inches. Production averages about 4 pieces per minute.

The smaller flange is blanked from 7/16-inch stock, blanks being 4 inches in diameter with a 17/32-inch hole, broached to 9/16-inch and then ball formed to 1 9/16 inches. Collar is 1 inch deep. Similar broaching and press equipment are used as on the larger flange, except that seven steel balls are carried in the auxiliary chute on the press.

High Speed Steel Balls

One of the problems incident to development of this unique method was that of obtaining satisfactory steel balls for the forming operation. Difficulty was experienced with the flange galling during the process with the result that the steel balls would pick up metal on their surface and become rough and off-size. Chrome steel balls were tried first, ground and polished to a high luster. Then it was decided to bonderize the surface of the balls. This proved to be an improvement over the highly polished surface, but later it was decided to change to polished high-speed steel balls which are now giving satisfactory service.

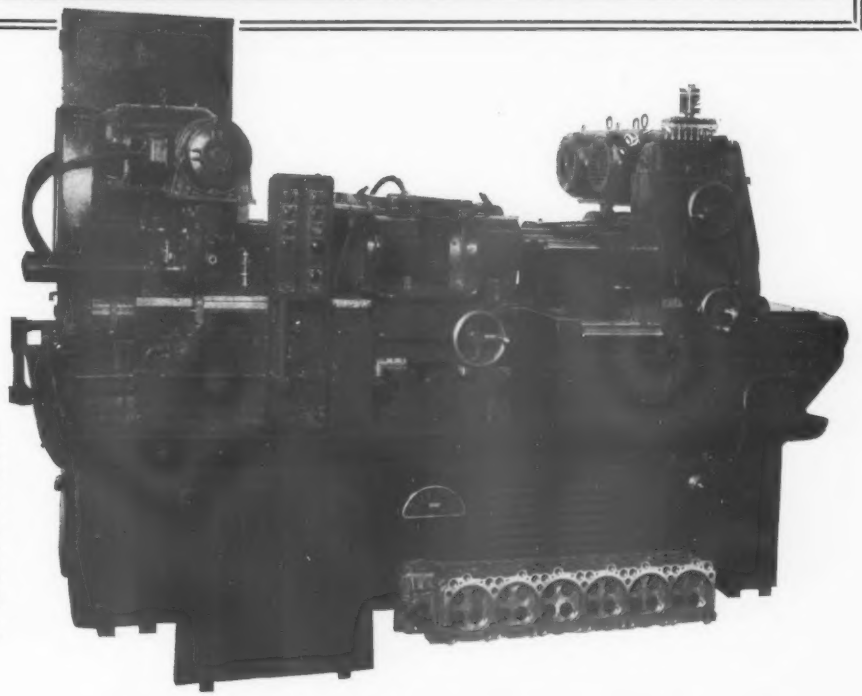
Another problem was selection of a suitable lubricant for the forming operation. Many different types were tried, including cutting oils of various trade names, but it was finally determined that ordinary machine oil gave the best results.

Recently several hundred employes of the Worthington Pump & Machinery Corp., gathered with company officials to join in the presentation of service pins to 148 employes of the highly important national defense concern. In the presence of H. C. Beaver, president of the Worthington Corporation, H. A. Feldbush, head of the Holyoke works made the presentations in a fitting setting in the new and still unoccupied defense production building. There were 50-year service pins awarded to John C. Dickinson of South Hadley Falls, connected with the company for 53 years and now a member of the sales staff and Nelson W. Hart, veteran accountant. Each was presented a solid gold pin with a diamond chip. Next in line in point of service was James J. Murray, an employee for a period of 40 years.

The Machine of the Month

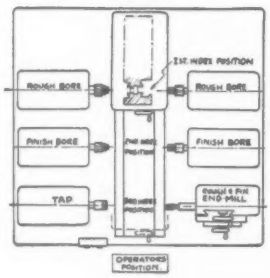
...IT ROUGH BORES
...IT FINISH BORES
...IT TAPS
...IT CONTOUR MILLS

This new Snyder-Built unit does the work of FOUR STANDARD MACHINES!



Part is manually clamped in 3rd index position. Upon starting unit, part moves hydraulically to 1st index position for rough boring. Fixture then travels to 2nd index position for finsh boring; then to 3rd for tapping. All these operations are completely automatic. Fourth operation — profile end milling — is completed manually through two hand feed wheels while tapping is being done. Unloading is accomplished in the 3rd index position. Production—3 aircraft cylinder heads per hour.

GRAPHIC OVERHEAD VIEW



● In the ever-expanding aircraft engine field, the call is for "more production" . . . yet costs must be held in proportion to output, and efficiency maintained . . . in short, it presents a situation ideally suited for SNYDER-developed machines. In view of these facts, here's a SNYDER unit for this fast moving industry . . . ***a single unit that takes the place of four standard machines.*** At first glance, this grouping of operations shows engineering ingenuity . . . but stop to consider the savings . . . set up time on four machines is eliminated . . . there's no moving of parts from machine to machine . . . one operator instead of four . . . and many other plus values. This ability to provide special machines that mean ***more work at less cost*** is yours to utilize . . . SNYDER builds a wide range of units ideally suited for particular jobs . . . or designs specific units. Call on us — we'll help you solve trying production problems.

FOR INCREASED OUTPUT AT LOWER COST . . .

SEE SNYDER BEFORE YOU PLAN PRODUCTION SET-UPS!

SNYDER TOOL & ENGINEERING CO.

DESIGNERS AND BUILDERS OF SPECIAL MACHINERY

3400 E. LAFAYETTE ST. DETROIT, MICH., U. S. A.

Connecticut Trains Tool Engineers

By ED MORANCEY
Educational Committee Chairman, Hartford Chapter

As the struggle goes on all over the world, we in America are arming ourselves on a scale unprecedented in our national history. The gigantic task of forming a vast volume of intricate machines, tools and structures has strained our economic system, tried sorely the recognized genius of American management and brought into clear, bold relief basic production maladjustments. Priorities are an evidence of this maladjustment, arising at least in part from lack of foresight. Up to the present, these priorities have affected only materials. We must recognize, however, that materials present only one side of the picture, for it is the skill of trained craftsmen capable of precision work and men trained in the art of devising tools for speedy production upon which the full flowering of our production effort ultimately rests. These skills are acutely scarce at present and will become increasingly so as key industries such as aircraft expand their production facilities and step up their schedules of output.

Those who have analyzed the German pre-war preparation of a balanced labor supply for purposes of a war economy, this is no surprise. As far back as 1936, the men in control of the German economy established a compulsory apprenticeship system and placed 800,000 apprentices in training. The latest available figures for the United States indicate that only 125,000 young men are being given comparable opportunities to acquire the broad experience and technical instruction which would qualify them as craftsmen. To meet our needs, this figure should be approximately 1,000,000 men.

The great imponderables which exist in the world situation today require long range planning and the exercise of great initiative if we are to build in time the means with which to assure our safety. If, as is generally recognized, human skills are one of our most acute shortages, then our human resources of latent skills must be developed through training programs. The gap must be filled and what Germany accomplished by compulsion, American management must do under the democratic method by private initiative, within the framework of a coherent plan.

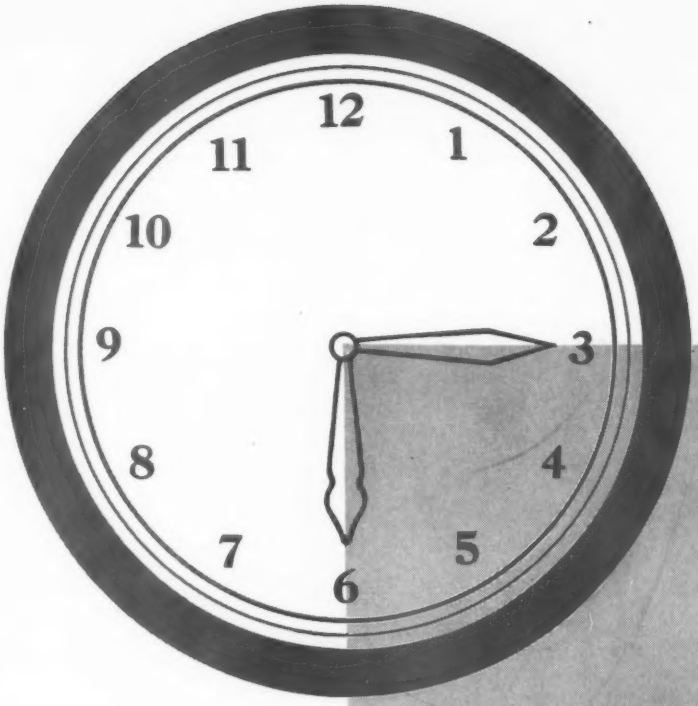
AT FIRST GRADUATION CONNECTICUT STATE APPRENTICESHIP COUNCIL

Reading from right to left: **Mr. William F. Patterson, Chief of the Apprenticeship Unit, United States Department of Labor; Mr. William L. Batt, president of SKF Industries and Deputy Director, Production Division Office of Production Management; Mr. Ray H. Morris, Second National Vice President, A.S.T.E; Honorable Robert A. Hurley, Governor, State of Connecticut; Mr. A. H. d'Arcambal, Past National President A.S.T.E.; Mr. Edmond Morancey, Chairman, Educational Committee of Hartford Chapter; Mr. George G. Leitch, Asst. Chairman, Educational Committee of Hartford Chapter; Mr. Frank W. Curtis, National President, A.S.T.E.**

Basic Program

Connecticut is moving ahead on this program. Four years ago it was recognized in this State that the curtailment of training programs was causing a reduction in the number of skilled workers and that unless action was taken to correct this condition, shortages of skilled labor even for peace-time needs would be inevitable. To meet this need, the Connecticut State Apprenticeship Council (THE TOOL ENGINEER, April, 1941, p. 80) was formed. This organization is composed of three representatives of employers, three representatives of employees and four representatives of public agencies. It works in close cooperation with the Federal Committee on Apprentice Training on the following basic program:

1. To stimulate interest in the bona fide apprenticeship in all skilled trades throughout the state of Connecticut.
2. To encourage the thorough preparation of future workers in the



GRAPHITIC STEEL

machines 25% faster

Any machinist who has used Graphitic Steel will tell you that it machines at least 25% faster than comparable steels. We say 25% because we want to be conservative and we believe this represents the minimum in performance.

Disregard for a moment the other superior qualities of Graphitic Steel and think what this one factor can contribute toward speeding up your production.

Write for your copy of the Graphitic Booklet. It tells all about Graph-Mo, Graph-Tung, Graph-Sil, Graph-Al and Graph-M.N.S.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
Steel and Tube Division

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TRADE-MARK REG. U. S. PAT. OFF.
ALLOY STEELS

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

skilled trades under standards which will insure full craft experience in all branches of the trade, supplemented by technical instructions in related subjects, where available.

3. To promote formulation of standards of apprentices through the joint action of employers and employees, and to assist in their development.
4. Cooperate with the Federal Committee on Apprentice Training and with national and state organizations of employers and employees which have established standards of apprenticeship.

On August 7, 1941, as further means of stimulating this program, graduation exercises were held for apprentices trained under standards approved by the Council. Participating in these exercises as speakers were Governor of Connecticut, Robert A. Hurley; William L. Batt, Deputy Director, Production Division, Office of Production Management; Cornelius J. Danaher, Commissioner of Labor; Alonzo Grace, commissioner of Education; and William F. Patterson, Chief of the Apprenticeship Unit of the United States Department of Labor. This program constitutes one step in the program of giving recognition and status to craft training and proposes by increasing the prestige of the trade to bring young men of real potential ability into these fields of work. It constitutes a new educational movement in which young men are trained by actual job experiences coupled with related training to provide them with skills and information which serve basic needs in our economy. Increasing the opportunities of these young men to carry this basic training further should be encouraged by all organizations directly or indirectly concerned.

What can the Tool Engineers do? The history of the A.S.T.E. shows that most of the members came up from the bench to tool designing, the long, hard way in which perseverance and ability leavened with chance were important factors. The American Society of Tool Engineers welded the men of this profession together and raised the standards by which they were judged. The background of the organization, the knowledge of the essential value which basic training in actual tool making and machinist work has for the Tool Engineer, offers a unique opportunity to contribute to the training program.

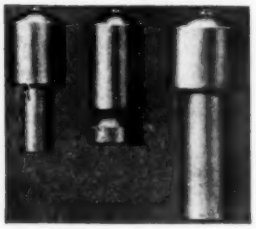
A great and increasing scarcity of Tool Engineers exist today. The Connecticut plan proposes to formulate and place in operation a program for carrying on the training of a select group of apprentices so that they may acquire the knowledge with which to become Tool Engineers. Contacts have already been made with representatives of the State Apprenticeship Council, the Federal Committee on Apprentice Training, local educational authorities and employers for the purpose of implementing this program. We recognize full well the axiom that, "If we would build machines, we must first build men." The educational committee of the Hartford chapter is working closely with the other committees mentioned in this constructive program.

FACTS
you should consider when buying
INDUSTRIAL DIAMONDS

1. The kind of work to be done
2. The type of Diamond best suited to the job
3. The Market Value of such a Diamond
4. THE REPUTATION OF THE DIAMOND SELLER

Unless you're an expert on the many grades and uses of Industrial Diamonds—beware of "bargains". There are many different qualities and each should be priced according to its value. Deal only with established, reputable firms—skilled in the selection, setting and applications of diamonds—who will advise honestly on the quality, value and correct use of their products.

You needn't be an expert to safely buy diamonds from Anton Smit & Co. —for over 30 years specialists in Industrial Diamonds and Tools. Rely on this reputation and experience to guide you in the proper selection of your diamonds. Consult us on your needs. Send blueprints of special shaped tools for quotation. Write for detailed, illustrated folder.



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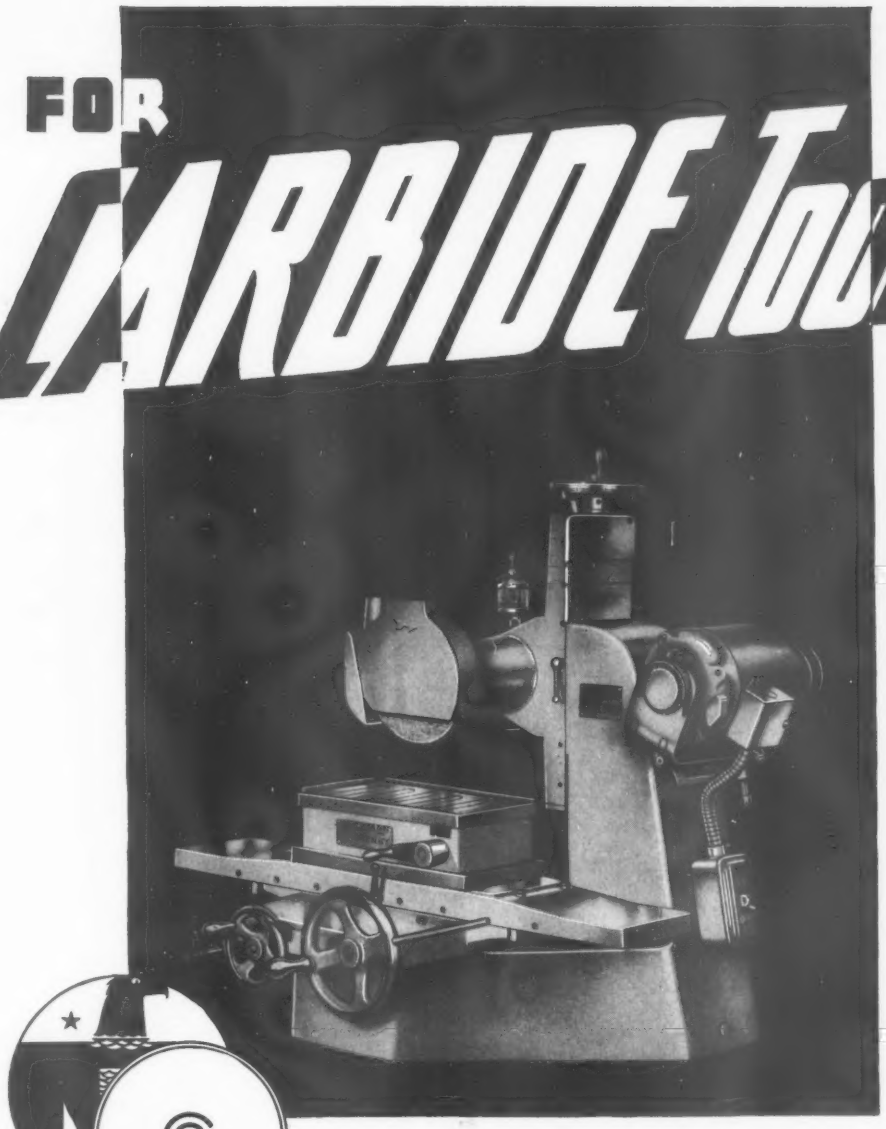
IMPORTERS OF INDUSTRIAL DIAMONDS—BORTZ, CARBONS AND BALLAS.
MANUFACTURERS OF ALL KINDS OF DIAMOND TOOLS.

FOR CARBIDE Tools



The high efficiency of carbide tools is dependent upon an accurate grind. The Grenby S-1 Surface Grinder is used extensively for carbide tool grinding. For this work it has no equal.

These features combine to give a perfect grind on carbides:

1. Smooth cable feed; no chatter.
2. Spring loaded counterbalanced spindle.
3. Precision spindle accurate to .0001.
4. Optional tool holding accessories.

The Grenby line also includes Internal, External, Flute and Cutter Grinders. SEND FOR THE GRENBY CATALOG.

GRENBY MFG. CO.

PLAINVILLE, CONNECTICUT

★

Handy Andy Says—

THIS is written in the woods of northern Michigan, at an isolated camp situated on a wilderness lake and reached by tortuous trails. Deer paths abound, the trees are scarred by bears measuring their height and, mayhap, advertising their might, and one's rest is interrupted, rather than broken, by the occasional scratching of porcupines and inquisitive, nocturnal prowlers. Here, one revels in the tang of birch and pine, amid which the rotting stumps of erstwhile primeval giants stand as mute, ghostly reminders of a lumbering empire that was. Exploring in glen and morass, one finds orchids and growth to delight the naturalist, and I have rediscovered plants that, intriguing my interest as a boy, erased the years as if by magic. Here is quiet solitude where, remote from urban disturbance, a man can think straight, swayed only by the moods of nature. And here, I have thought out many things, have envisioned things that, inevitably, must come to pass. But, right now, a deadline approaches, so we'll take things as they come to mind.

▼ ▼ ▼

Got a kick out of an article in a not so current popular magazine which, with random paper used to cushion the typewriter en route, has provided my only reading matter. It tells about Sen. Wheeler and Lindberg. It seems that there's some affinity between 'em, like wanting to run for Prex and V.P. come next election, hope springing eternal and all that. Anyway, the Senator dubbed Lindy a Swede, and implied that they're stubborn as h——. But no! He just said they were stubborn, among other things. It's not so, either way. Lindy is no more a Swede than Clyde Mooney is Irish, both having been born here although neither could repudiate the imprint of paternal ancestry. And the Swedes are not stubborn, rather, are quick to concede a point provided that the other fellow has a convincing argument. Ask Bill Stout, he'll tell you. It's the Danes and Norwegians that are stubborn. For example, when I was coming over on the boat I got into an argument with a Dane, and you know, the guy was still unconvinced when we got to New York. But we'll meet again, some day, when I'll show him who s right.

▼ ▼ ▼

Just before leaving, I had a very interesting letter from Aaron E. Carpenter, editor of the Houghton *Line*, in response to my "open letter" in the July TOOL ENGINEER. He still disagrees with me (no connection with the Danes) and wishes that he could share my optimism about our defenses. Well, that's nice. But really, I was just trying out a bit of psychology, like the gentleman farmer who put the ostrich egg in the hen's nest as a mark to shoot at. As you boys know, I have been quite critical—nay, downright impatient—of strikes, jurisdictional disputes, alphabetical wrangling and government red tape which, individually and severally, have seriously impeded our preparedness program. But, for a change, I thought I'd play with the god Billiken and paint things as they ought to be.

▼ ▼ ▼

You know, it's all okay for a native son to pan the Administration, that being the unwritten clause in the Bill of Rights. But it happens that I am born on the other side, and while as staunchly American as the Yank born in Ohio or Rhode Island, (well, Connecticut,

TANNEWITZ HIGH SPEED METAL CUTTING BAND SAWS

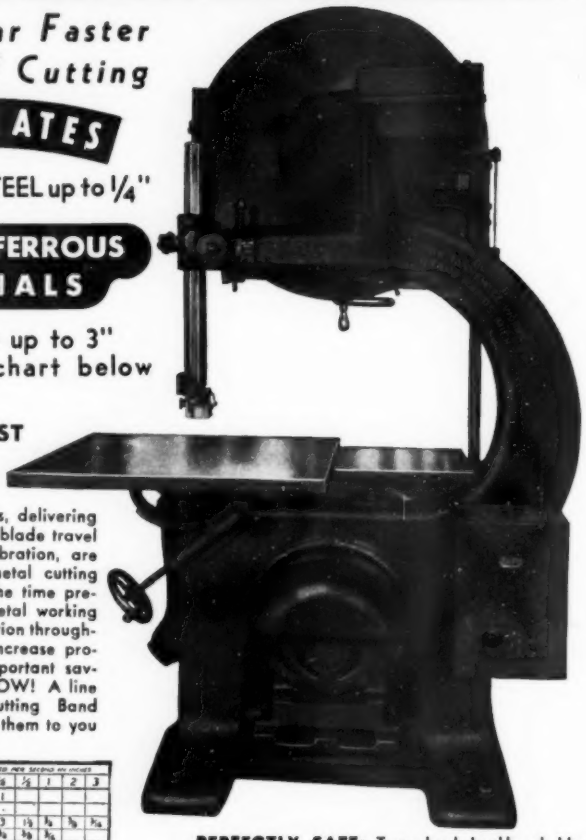
. . . a far Faster Means of Cutting

TEMPLATES

from SHEET STEEL up to 1/4"

NON-FERROUS MATERIALS

of all kinds up to 3" thick — see chart below



SAVE THEIR COST IN SHORT ORDER

These superb machines, delivering over two miles of saw blade travel per minute without vibration, are doing hundreds of metal cutting jobs in a fraction of the time previously required, in metal working plants of every description throughout the country. To increase production and make important savings get the details NOW! A line requesting Metal Cutting Band Saw Bulletin will bring them to you promptly.

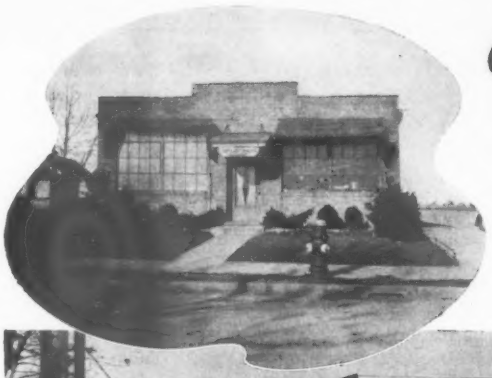
KIND OF MATERIAL	Thickness and feed per second in inches: 1/32	1/16	1/8	1/4	1/2	1	2	3
Mild Steel	12-24	6	3	1				
Stainless Steel	6	2	1					
Yellow Brass, Zinc	24	12	6	3	1½	¾	⅜	¼
Bronze or Copper	6	3	1½	¾	⅜	¾		
Aluminum	24-36	18	9	4½	2	1½	1	¾
Duraluminum	24	12	6	3	1½	1	½	½
Single Plywetal				6	4			
Double Plywetal				4	3			
Plywood	24-36	24	20	16	12	6	3	1½
Asbestos Board	12	6	3	1½	¾			
Fibre (Hard)	24	12	6	¾				
Paper Board	24	18	12	4	2	½		
Masonite	24	18	12	6	3	1½	¾	⅜
Bakelite	12	6	3	1½	¾	⅜	3/16	

PERFECTLY SAFE: Two-wheel Lockheed Hydraulic Brakes automatically and instantly stop the wheels in case of saw blade breakage—completely guarded.

Incorporated in Tannewitz High Speed Band Saws are many highly developed, patented features found in no other band saws.

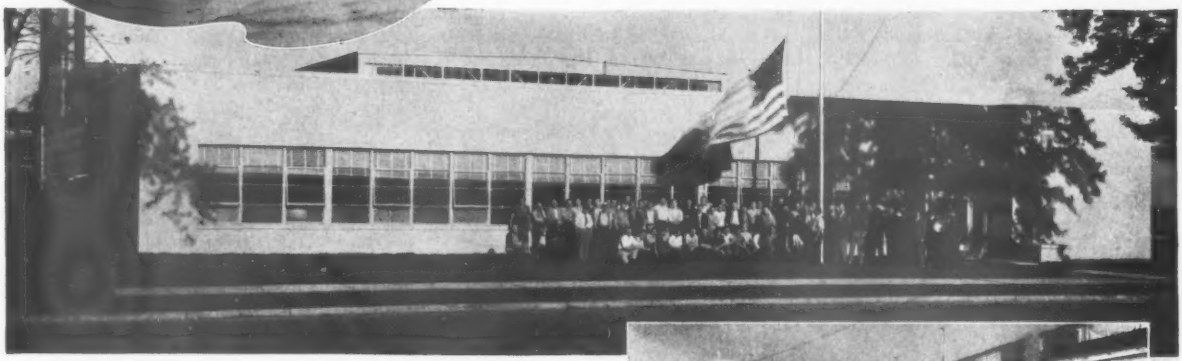
Made by Sawing Machinery Specialists

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.



Fourteen Times

THE PRODUCTION CAPACITY OF 1934



- The top illustration shows the shop in which the first Detroit Broaches were manufactured in 1934.
- The photograph of the new plant was taken as the employees presented a flagpole and flag to the company.
- At the right are typical views of the present shop and drafting room.

The Detroit Broach Company is in a new home! This plant is three times larger than that recently occupied . . . has fourteen times the production capacity of the shop used when the company was organized in 1934.

The completion of this thoroughly modern factory is significant in more ways than one. It is unquestionable proof of the exceptional progress made by this company in only seven years. It provides additional facilities for the production of broaches and broaching fixtures so necessary today in the Defense Industries. It assures continued advancement in the design and manufacture of products which will be vitally important in the metal-cutting operations of the future.

A cordial invitation is extended to you to visit our new plant at any time.

DETROIT BROACH COMPANY

20201 SHERWOOD AVENUE • DETROIT, MICHIGAN

then, until Little Rhody joins the A.S.T.E.) any criticism on my part might be construed as defeatism. Besides, my native heath has been imputed pro-Nazi, a canard that persists despite that the Swedish press is frankly censurious of the Nazi regime and the country's defenses are as frankly directed against the one potential enemy —Germany! Not the Germany that was, but the Reich that is, for a nation which has made democracy work and which symbolizes its very spirit cannot subscribe to an ideology that, while arrogating freedom for itself, would enthrall all the rest of humanity.

▼ ▼ ▼

Sweden is free (to date) because, when the war broke out, it was not only reasonably prepared to defend its neutrality, but, with the possible exception of Finland and Switzerland, was the one European state where preparedness was combined with unity in essentials. There, people and government were as one, there, capital and labor had learned to work together, there, neither communism nor fascism had made an impress, a sound social and economic structure precluding internal dissension. There, a masterly diplomacy has negated the "moral suasion" of the authoritarians, while a trained and incorruptible army and a fine navy have presented such barriers that, on a conservative estimate, invasion would cost an enemy power upward of a million lives, with the results doubtful at that. No, it is not subservience to totalitarian mandate, and certainly not isolation, that has kept a small nation inviolate while the major part of continental Europe lies prostrate if resistant under the Nazi heel. It is because of qualities that the experts have overlooked, and largely because, porcupine like, it bristles with spines—of steel!

▼ ▼ ▼

Well, that's not what I started to write about. But you know, I've taken more than my share of razzing from this and that rocking chair expert on affairs international who imply that a handful of people—six and a quarter million—could have performed miracles of intervention so far beyond the power of the larger, contending democracies. I am tired of hearing my people aspersed, weary of innuendo designed to undermine a friendship which has existed, without a break, since long before the United States became an independent nation. So, when a chance thought, like a stray spark, penetrated to the magazine of repressed resentment, I sort of blew up and you boys got a whiff of the smoke. But it may be as well, since my own stand and that of my racial kindred is now quite clearly defined. Individually and collectively, the Scandinavians are very much pro-United States, make no mistake about that.

▼ ▼ ▼

The foregoing is not entirely irrelevant to the purpose of this column, since a very considerable proportion of the Society's membership is composed of Scandinavians, and while, as a race, we have learned to take criticism, trusting to time to vindicate a stand not always obvious, that doesn't necessarily imply that we like it. But because of criticism not always justified, we have learned to feel for our fellows. That may explain why, in this crisis, I have defended Americans of other racial stocks whose loyalty is unimpeachable but who are expected to silently bear up while their race is smeared. No American by choice, having severed native ties, is responsible for the acts of zealot, fanatic or betrayer in the land of his fathers. Yet, no land so poor that it has not reared shrines to heroes and patriots, and none so great

(Continued on page 112)

For Your
"Production Peace-of-Mind"

DBL HIGH SPEED STEEL

★Contains less than one-third as much tungsten as 18-4-1 High Speed Steel.

★Performs as well or better than 18-4-1 in 85-90% of all cases, including those jobs peculiar to defense needs, such as the machining of armor plate.

★Heat-treats and handles in the same equipment, and with the same technique, as 18-4-1 . . . you have nothing new to learn, and no new equipment to buy.

★Requires no coating to control "decarb."

★Costs less than 18-4-1, and is lighter . . . you get more pounds per dollar, and more tools per pound.

TUNGSTEN restrictions needn't bother you. You can change over from 18-4-1 to DBL High Speed Steel, a great "V . . ." alloy, without any headaches, and without losing a single step in your production pace. In fact, you can even gain marked advantages (see the comparison between 18-4-1 and DBL at left).

The only difference between the two in handling methods is that DBL heat-treats at slightly lower temperature than 18-4-1. All you need is the "DBL Blue Sheet", which contains complete information. Send the coupon below for your copy.

Note: A-L "moly-type" High Speed Steels also include grades with lower tungsten content than DBL, as well as "no-tungsten" types—all well established and proved in service. Please make full use of our Mill Service Staff to help you apply these steels to your needs. • Just contact any Company office—ask for Mill Service on Tungsten.

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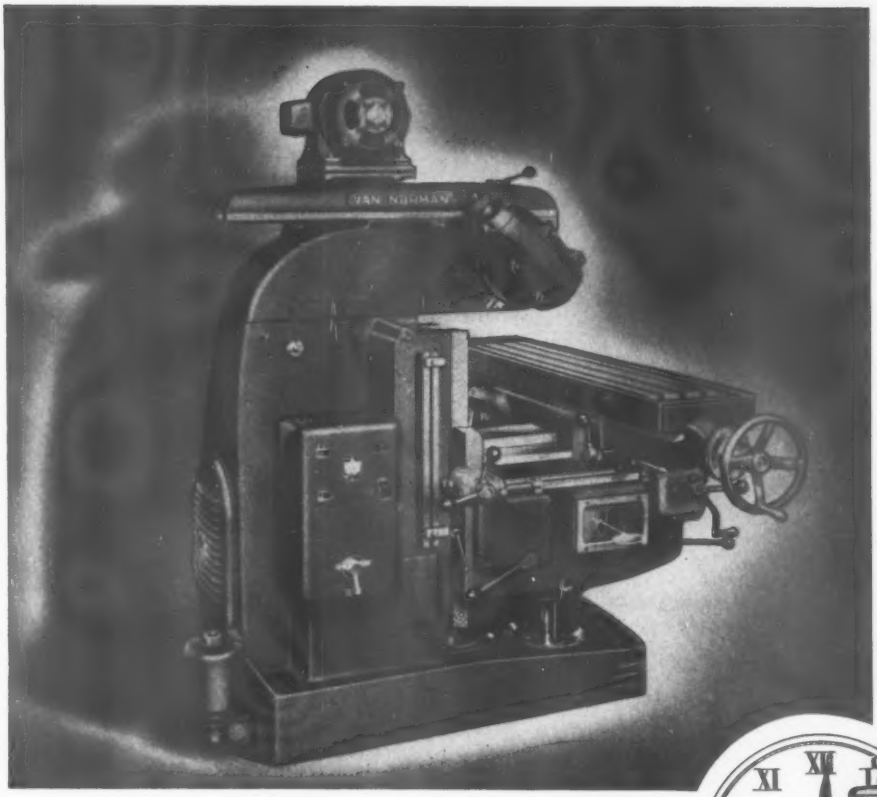
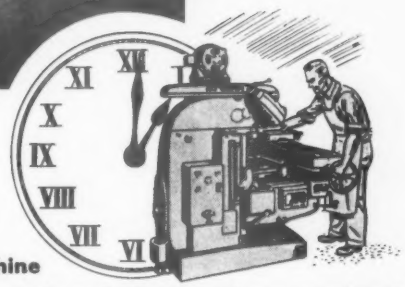
Send me a copy of the "DBL Blue Sheet."
Name
Company
Address T-149





MORE WORK PER MAN-HOUR . . .

As one authority puts it: "You don't buy a machine tool so much as you buy results — the greatest number of pieces per hour, produced with highest accuracy." And this is exactly what you get in every one of the five models of Van Norman Ram Type Millers. Your operators can turn out more and better work because they have so much less preliminary, error-charged, fussing to do . . . because it is so much easier to set up these machines . . . and to control them when they are in operation. Set-up time is saved by combining the adjustments of cutterhead and ram to take successive cuts from horizontal to vertical.

Control is simplified by grouping the levers, governing direction of power feeds and of 6-way rapid traverse, right at operator's fingertips on both sides of the machine . . . and by giving him large dials for easy, accurate reading. And accuracy is underwritten by Van Norman's 50-year tradition of high-precision manufacturing . . . by full measure of quality in every mechanical feature, including ample weight and rigidity for smooth operation on heavy cuts. That's why . . . when you buy a Van Norman Universal . . . you buy results.

No. 26 & No. 36
RAM TYPE UNIVERSAL
Table: 50" x 12"
Range: 28" longitudinal, 12" cross, 18" vertical
(No. 36 Table: 58" x 13")

Van Norman Machine Tool Co., Springfield, Mass.

IT'S NEW

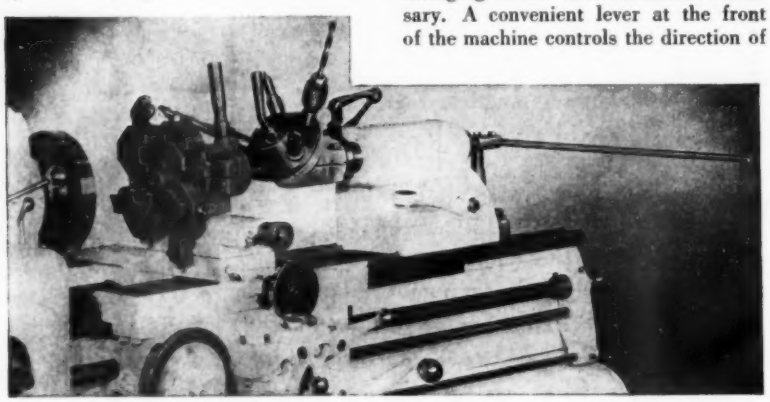
NEW EQUIPMENT – NEW MATERIALS – NEW PROCESSES

LANDIS (F16) RADIAL CRANK GRINDER

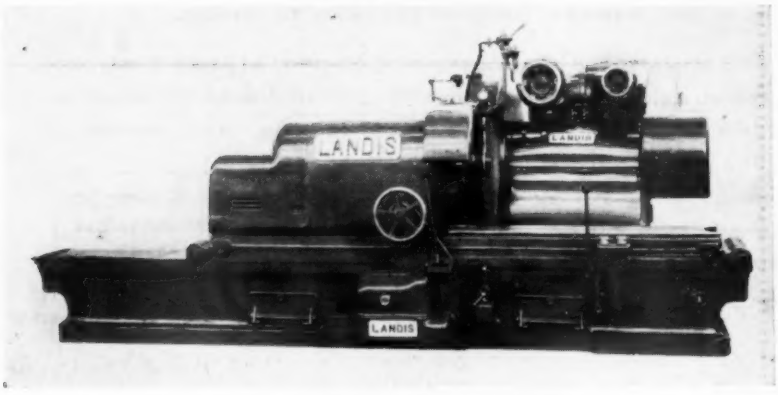
A specialized machine intended for radial crankshaft work has been developed by the Landis Tool Company, Waynesboro, Pennsylvania. In spite of its specialized nature, the machine is said to be with the proper tooling, suitable for a wide variety of operations, including rough grinding the pin diameters and adjoining radii, squaring the ends of the center section, grinding the web faces adjoining the pins of the center section, squaring the ends of the pins on both the front and rear sections, grinding web faces adjoining the pins on both the front and rear sections, semi-finish grinding the pin and adjoining radius on both the front and rear sections, and finish grinding the pins and adjoining radii after assembly of the shaft.

The 25" swing gives the machine sufficient capacity to handle the largest of radial cranks. The headstock is said to be of particularly rugged design and the work spindle is unusually large and hollow. This permits either the long or the short end of the shaft to be inserted within the end of the spindle during the finish pin grinding operations after the shaft has been assembled.

A 42" diameter grinding wheel is used. In view of the deepness of the web faces on radial cranks, this permits a large amount of wheel wear before changing of the wheel becomes necessary. A convenient lever at the front of the machine controls the direction of the feeding movement, while a nearby valve regulates the speed of the slow or dressing feed.



Jefferson Turret Attachment
Gives the advantage of turret operation.



Landis Radial Crank Grinder
With the proper tooling—a wide variety of operations.

JEFFERSON (F17) TURRET ATTACHMENT

Tool-post and tail-stock turret attachments are featured by the Jefferson Machine Tool Co., Sweeney, Fourth, and Cutter Streets, Cincinnati, Ohio. An adjustable pull-feed is also offered for making tail-stock movement easy and rapid. The tool-post turret can be mounted readily on the cross slide or the compound rest of the tool-post carriage. It is said that the four tools may be inserted easily and are held rigidly, giving the advantage of turret operation.

It is emphasized that the head may be adjusted accurately and quickly to any desired pitch or height in relation to the lathe center. It can be made interchangeable if desired for several lathes.

The tail-stock turret accommodates five tools and can be attached quickly to the spindle of the tailstock of an engine lathe. It is said that when once attached, each tool positively centers automatically when brought into action by means of an indexing plunger. Fitting on the outside diameter of the tail-stock spindle, this attachment permits such operations as forming, roughing, boring, finishing, drilling, etc. without stopping to change tools.

The tail-stock turret is offered in four sizes from models for small engine lathes up to larger types for spindles of 3¼" diameter. It also may be adapted to several lathes if desired.

The adjustable pull-feed is designed to eliminate the slow movement of tailstock by the usual hand wheel method. A slight pull on the long lever moves the tailstock where desired. It can be used on any lathe having 18" swing or less.

PRATT AND WHITNEY CONTACT GAGES (F18)

The new Pratt & Whitney Multiple Electric Contact Gage has been developed for fast accurate inspection methods by Pratt & Whitney Division, Niles-Bement-Pond Company, West Hartford,

FREE INFORMATION and SERVICE

Request the information and service you desire and keep your library up-to-date . . .

THREE FREE SERVICES . . . WITHOUT OBLIGATION

For your convenience, these three business reply cards enable you to request quickly . . .

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2 Additional information or bulletins relative to new equipment—new materials or new processes.

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Simply fill out the card, indicating the information or service you desire, and mail. Be sure to write, in the square, the identifying number of the catalogs or bulletins covering new products described. In answering an advertisement, include the name of the advertiser and indicate by a cross if literature is desired or if company representative should call. No stamp is required.

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USE THIS CARD for requesting new catalogs and bulletins listed in this issue.

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3

USE THIS CARD when answering advertisements, to obtain specific information on problems or when you desire a company representative to call.

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Requesting:
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REPRESENTATIVE TO CALL

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This ARTER *combines*

SIMPLICITY OF OPERATION
EXTREME PRECISION
and
INCREASED OUTPUT

• Small wonder that this Arter Rotary Surface Grinder—one of three Model A-1-12 machines in the Fellows Gear Shaper plant at Springfield, Vermont—is reported as being "suited to the job."

Work being handled on this machine is that of grinding both ends of a case hardened steel worm which when finished must run dead true and be free from chatter.

With this Arter-in Action, 16 pieces are finished per hour, which is "double production" over the method formerly employed for handling the operation.

Arter Rotary Surface Grinders can always be depended on to save time, improve finish, and cut costs, because they are designed for fast, close tolerance work, are rigid in construction and remarkably simple in operation.

Why not let our engineers study your grinding problem and show you how Arter Rotary Surface Grinders can be suited to your job of getting out more and better work.

•

Write for detailed specifications on Arter Rotary Surface Grinders—available in Light Series Type in 8" and 12" sizes and in a Heavy Type in 12" and 16" sizes. Hydraulically operated models in capacities from 16" to 40".

•

ARTER

GRINDING MACHINE CO.

Worcester, Mass., U.S.A.

Connecticut. It provides an extremely rapid means of checking several dimensions simultaneously. By pairs of red and green lights the inspector can tell instantly in one operation if any section of a part is too small, too large, or within the specified limits. Each gage is engineered for a particular job.

A typical example is the Multiple Electric Contact Shell Gage. Through its use a shell is accepted or rejected speedily as far as its many outside diameters are concerned. The Electric Contact Shell Gage comprises the signal box, the gaging fixture, and the masters.

The gaging fixture is composed of a base with positioning slide or ways, and a vertical column to which are attached the adjustable gaging sections. In most cases the gaging sections are supported independently by parallel flat springs. As the shell is slid into gaging position, each of the floating sections automatically aligns itself, producing an accurate diameter check regardless of possible eccentricity between the several dimensions. Each gaging section has a fixed anvil and a movable spindle which actuates the contact arm. The light contacts are readily adjustable so that diameter tolerance can be set quickly and easily.

Maximum and Minimum Masters are furnished with the gage for setting purposes. These are made in sections for manufacturing purposes but are the equivalent of solid masters when assembled.

CINCINNATI HYDRAULIC GRINDER (F19)

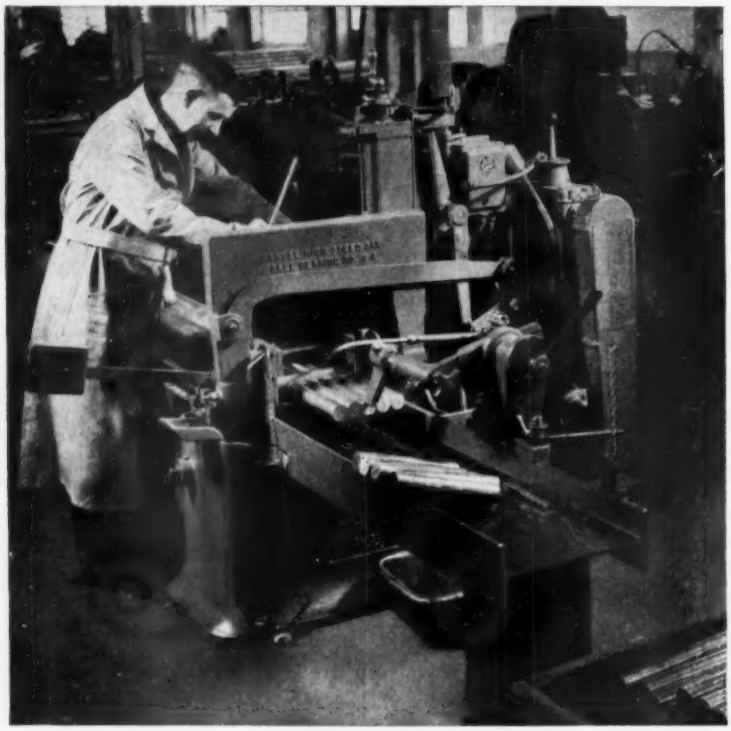
A new line of universal grinding machines, built in 14″, 16″, and 18″ swings, and 36″, 48″, and 72″ between-center lengths for each swing, have recently been announced by Cincinnati Grinders Incorporated, Cincinnati, Ohio. "Hydraulic Universal" these machines embody features similar to the highly successful 12″ size, introduced about a year ago.

The table is powered hydraulically, having infinitely variable traverse rates of 3″ to 220″ per minute. Power table stroke may be set as short as 3/32″, simulating the action obtained from a reciprocating grinding wheel spindle. Accuracy of automatic reversal is within .004″, allowing the operator to power grind exceptionally close to shoulders

Cincinnati Hydraulic Grinder

without fear of spoiling the work. Hand table traverse has two speeds (mechanically controlled) 1/10″ per turn of the handwheel for close adjustment and grinding shoulder; 15/16″ per turn for setting up.

Filmatic bearings are used for the main grinding wheel spindle. Each bearing consists of five heavy steel shoes with bronze lining next to the spindle. These shoes are constructed to create wedge shaped oil films, are self-adjusting for variations in load produced by the variety of grinding cuts encountered with universal machines. The bearing



MARVEL 9A (capacity 10"x10") Cutting-off shafts at the Monarch Machine Tool Co.

Fine Machine Tool Builders Know Their Machine Tools!

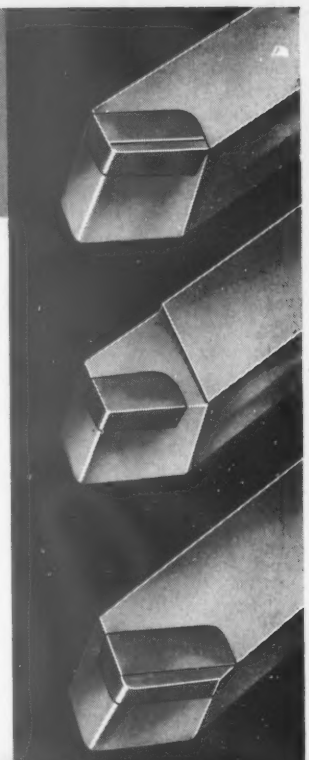
When the Monarch Machine Tool Co., builders of Monarch Precision Lathes, needed another cutting-off machine, they chose a MARVEL 9A Production Saw . . . one of MARVEL'S new heavy-duty, all-ball-bearing sawing machines with automatic bar push up. These are the fastest saws built—will cut-off more pieces, floor-to-floor, from single or nested bars than can be cut-off by any other method.

Buy from your local distributor.

MARVEL SAWS

ARMSTRONG-BLUM MFG. CO. *"The Hack Saw People"*
5700 Bloomingdale Ave., Chicago, U.S.A. Eastern Sales: 225 Lafayette St., N. Y.

There is a Difference in Carbide Tools!



THIS time, try TECO Carbide Tools. You'll find out why they're *preferred* when a particularly tough machining job has to be done *fast*. Tool up with TECO Tools, put them to work on the meanest job in the shop, and crowd them hard! That's when the advantages of TECO tools really show up — in faster production, finer finish, fewer rejects, and less non-productive machine time.

Here's why TECO CARBIDE TOOLS reduce costs and speed up production—often more than 75%.

Rough and finish in one cut • 10 to 50 times more pieces per grind • Machine steel up to 550 Brinnel — without annealing • Reduce floor to floor time up to 30% • Increase tool life as much as 200%.

TECO METAL is available in grades suitable for cutting almost any machinable material. Ask for a shop demonstration without obligation, and use Teco's consulting service whenever there's a tool problem to solve.

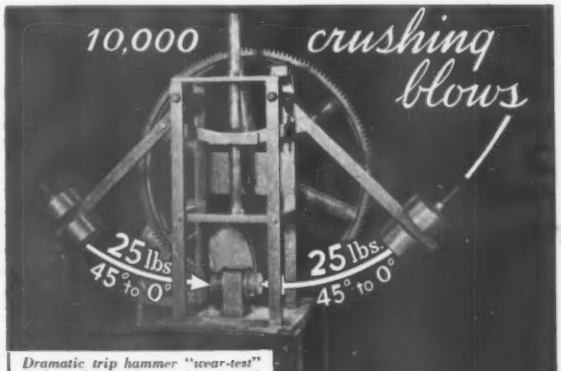
Tungsten Electric supplies Carbide Blanks, Tools and Bits, Wire and Bar Dies, Tubing, Extruding and Sizing Dies, also special tools such as Spot Facers, Reamers, Combinations, Broaches, Forming Tools, and TECO METAL for hard-surfacing parts subject to unusual loads.

TUNGSTEN ELECTRIC CORPORATION • 570-39th STREET, UNION CITY, N. J.

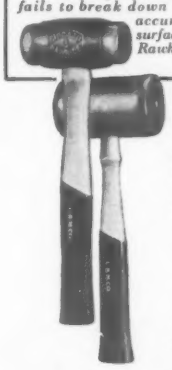
Branch Office: 2900 EUCLID AVE., CLEVELAND, OHIO

Pioneers in Tungsten Carbide for over a Quarter of a Century

TECO CARBIDE TOOLS *pay dividends!*



Dramatic trip hammer "wear-test" fails to break down the smooth accurate striking surface of Chicago Rawhide Hammer.



After 10,000 blows with a free falling 25 lb. weight striking, crushing blows simultaneously on both faces of a Chicago Rawhide hammer—there was still a smooth, accurate striking surface.

The genuine Java Water Buffalo hide faces had worn off ⅛" (less than one-quarter of the usable surface of hammer inserts). Even these solid steel knurled faced hammers, dropping 19" at 45°, had done nothing more than wear the surfaces.

Your interest in this test is this:
Chicago Rawhide Hammers and Mallets, which strike hard blows softly without damage, can take hard blows indefinitely without damage. Q.E.D.

These economical long wearing tools are made in sizes and weights to meet every need. Insist on genuine Chicago Rawhide Hammers.

CHICAGO Rawhide MFG. CO.

1393 ELSTON AVE.. ★ CHICAGO, ILLINOIS.

MOREY "27" SEMI-AUTOMATIC HEAVY DUTY LATHE

Just the Machine for Shell Work!

Suitable for rough or finished turning shells at maximum feed.

Put your shell operations on this fast powerful lathe and turn out your work at top speed up to the limit of tool capacity.

Multiple tool holders can be supplied at front and rear; a turret mounted on separate saddle can be used instead of tailstock.

Full use of carbide tools can be taken by this heavy duty lathe.

Ask for Circular No. 715

MOREY MACHINERY CO., INC.
410 Broome Street New York, N.Y.

diameters of the spindle are super-finished.

A hinge-type bracket at the front of the wheel head contains the internal grinding quill and spindle. This construction eliminates the majority of the set-up time formerly required for the removable type internal attachment. Then, too, external and internal work can sometimes be ground in one setting, obtaining perfect concentricity. The attachment is always in place, yet completely out of the way for any job within the capacity of the machine, it is said.

VAN NORMAN BED-TYPE MILLER (F20)

An automatic bed-type milling machine with hydraulic table feed, developed for high production milling of small and medium-sized parts, has been added to the line of millers manufactured by the Van Norman Machine Tool Co., Springfield, Massachusetts. Designated as Model No. 118, this machine incorporates many novel features including automatic table cycle, automatic spindle stop, rigid construction and ease of operation, it is said.

The spindle transmission, located in a compartment at the rear of the bed, is driven by a 3 H.P. motor, hinge-mounted to facilitate belt adjustment to the main drive pulley. Spindle-speed changes are obtained through pick-off gears accessible in a housing at the rear.

The hydraulic mechanism for operation of the table comprises a pump and main control panel, together with necessary valves, all of which are located in a compartment at the front of the machine. The drive for the hydraulic pump is taken from the front end of the main drive shaft of the spindle transmission. The hydraulic feed cylinder is mounted on the bed directly under the table and has its pipe connections made through the bed at the main operating panel. Table dogs for automatic control of the main operating panel are located at the front of the table and are easily adjusted as desired.

The main operating panel has a control lever located at the right side which can be set manually to any one of four positions; neutral, rapid advance, feed, and return. The Vari-Throttle

Van Norman Bed-Type Miller

valve for setting the table feed rate, located at the left of this lever is adjusted by means of a knurled dial that can be quickly adjusted to the desired feed rate.

The spindle clutch, located in the spindle transmission compartment, is operated hydraulically by means of a clutch lever located in a panel at the right front side of the machine. The machine, however, can be provided with an automatic spindle stop which provides for automatic engagement and disengagement of the spindle in relation to the travel of the table. The normal cycle of the machine is rapid-traverse advance, normal milling feed, then an automatic rapid-traverse return to the starting position.

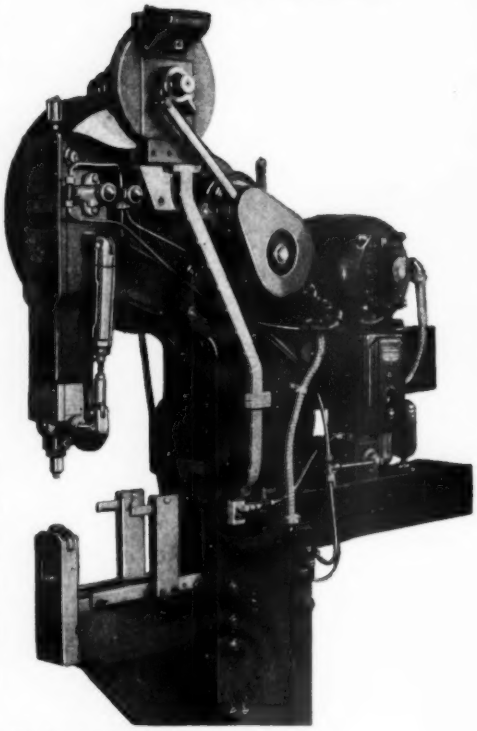
pierces and rivets

AUTOMATIC FEED "RIVET-PIERCE" RIVITOR

(the new "RK" machine)

The previously unpierced work is driven down over the underfed rivet—punching a slug out of the work. The rivet is then set at the next stroke of the machine.

Handles solid Steel rivets (unannealed) of sizes up to .140 dia. x ¼" long. These may be of any flat head type such as "coopers" or "tinners". The size mentioned above can be set in total maximum work thickness of .075.



write for particulars to
THE TOMKINS-JOHNSON COMPANY
624 N. Mechanic St., Jackson, Mich.

this is a **TOMKINS-JOHNSON** *product*

DRIVE SCREWS THE MODERN WAY

Increase Production Cut Costs

Special set-up feeding nuts and screws. Driving screw through nut and spinning end of screw.

THREE MODELS AVAILABLE

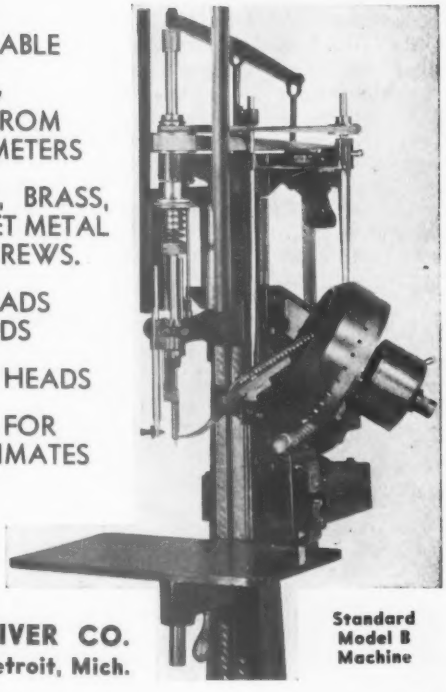
HANDLING SCREW SIZES FROM No. 2 To 5/8" DIAMETERS

MACHINE, WOOD, BRASS, SELF TAPPING, SHEET METAL AND SPECIAL SCREWS.

STANDARD HEADS SPECIAL HEADS

NO MARRING OF HEADS

SEND SAMPLES FOR PRODUCTION ESTIMATES



Standard Model B Machine

DETROIT POWER SCREWDRIVER CO.
5373 Rohns Ave. Detroit, Mich.

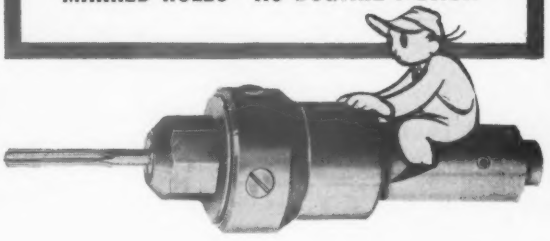
From Obscurity To Leadership IN 7 YEARS

The Putnam Tool Company was organized in 1934, occupying the small shop shown above.

Today, only seven years since the first Putnam Tools were made, a new, modern plant has just been completed . . . greatly increasing the production facilities . . . providing the finest in equipment and working conditions. It is the type of shop which reflects in every way the quality of the tools that "Cut Faster and Last Longer".

PUTNAM TOOL COMPANY
2987 Charlevoix Ave. • Detroit, Michigan

NEW UNIVERSAL FLOATING CHUCK—NO MARRED HOLES—NO DOGTAIL MOTION



Operates horizontally in automatic screw machine or turret lathe. Adjustable spring pressure in 4 directions counterbalances weight of tool and prevents marred or bell mouthed holes. Useful in any operation where piloting from the lead hole is required. Write for catalog.

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

HANNA PORTABLE RIVITER (F21)

A versatile hydraulic riveter is announced by the Hanna Engineering Works, 1765 Elston Avenue, Chicago, Illinois. A unique suspension system enables the operator to use this riveter in any position without difficulty, it is said. There are no hoses to retard the operator in rotating the riveter upon its suspension axis or getting from one rivet to another. No hoses to affect the center of gravity. The riveter is free to rotate or tilt in any position.

The flexible suspension feature of the Hanna Portable Hydraulic Riveter is said to assure the maximum in riveting speed. Push button on the riveter initiates the riveting cycle. Rivet die advances rapidly at low pressure until it contacts the rivet. Pressure increases as the rivet is driven. Reversal of rivet die occurs the instant the rivet is driven and the return to its starting position is rapid.

Essential safety features permit operator to reverse stroke instantaneously and automatically prevent repeat strokes. Pressure exerted by the riveting die may be regulated by simply turning the tonnage control dial. The riveter automatically adjusts itself to variations in the thickness of work being riveted.

SKILSAWS
Saw 10 times faster than by hand! Saves time in plant expansion, remodeling, maintenance . . . in shipping and receiving rooms . . . cutting Cabotes, Transite, compositions . . . cutting flat or corrugated metals. 9 Models.
SKILSAW BELT SANDERS
Finish finer . . . faster, and at lower cost! All finishing and refinishing is faster in production or maintenance work. Ideal for every job from coarsest sanding to finest honing on wood, stone, metal or compositions. 4 Models.
SKILSAW TOOLS
MAKE AMERICA'S HANDS MORE PRODUCTIVE!
SKILSAW DRILLS
More drilling power . . . more holes per hour! Speed up all drilling . . . from lightest boring and reaming in wood, steel and composition . . . to heaviest production work in maintenance or production. 22 Models.
. . . speed up every job that needs doing!
● Industry no longer is marking time . . . it's making time with SKILSAW TOOLS. By saving minutes on every operation, these high-grade tools save hours on each job . . . days on each project . . . weeks in America's defense! That's why more and more SKILSAW TOOLS are on duty throughout the land . . . serving industry better . . . making America's hands more productive.
In your plant are countless jobs that SKILSAW TOOLS can speed. Your distributor will gladly demonstrate them.
Prompt delivery on SKILSAW TOOLS for every defense need!
SKILSAW DISC SANDERS
Grind every waste . . . grind down costs! Speed up cut fitting, grinding, sanding, polishing, buffing and metal cleaning. They work equally well on flat and curved surfaces of wood, metal, stone, tile and compositions. 5 Models.
SKILSAW, Inc., 3051 Elston Ave., Chicago
New York · Boston · New Orleans · Philadelphia
Cleveland · Buffalo · Kansas City · Dallas · Oakland · Seattle · Atlanta · Los Angeles · Toronto, Can.
SKILSAW PORTABLE ELECTRIC TOOLS
YOUR DISTRIBUTOR WILL GLADLY DEMONSTRATE THESE TOOLS ON YOUR OWN WORK

LEES-BRADNER AUTOMATIC THREAD MILL (F22)

A compact, high production automatic Thread Miller, Model 40, with a generation of internal or external threads by the ring or hob type thread milling process is announced by the Lees-Bradner Company, Cleveland, Ohio. Due to the ingenious design of the workhead mechanism, the same master lead screw and nut for a specified pitch serve for the generation of both internal and external threads of the same hand; it is only necessary to change screws and nuts when changing to a job of the same pitch but of the opposite hand, thus effecting a considerable saving in master screw costs.

Due to the considerable diameter capacity adjustment, the same cutter can often be used for internal work as well as for external. Moreover, it is not necessary to have varying diameters of cutters for different diameter work, as is the case with some types of thread millers, since more than ample diameter capacity adjustment is provided on the Model 40.

Lees-Bradner Automatic Thread Mill

It is only necessary for the operator to load and unload the machine, and to actuate the starting lever. All the other functions of the machine are performed automatically.

SIMPLEX PRECISION BORER (F23)

The Simplex Knee Type Precision Boring Machine has been designed with a very high degree of flexibility to provide a means for handling economically

Are your tools "OK" for the pace of today?

WHETHER on armament commitments or regular contract work, O K Inserted-Blade Metal Cutting Tools on your lathes, planers, shapers, etc., will speed up performance and improve profits.

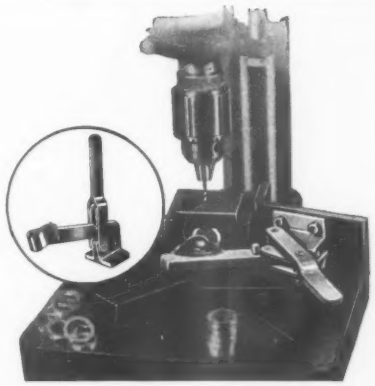
Only the bits of these tools are made of the expensive high speed cutting steel. The bodies are made of chrome nickel steel. The bit is held firmly in place by a system of mating serrations and a high-leverage lock. After regrinding, it is readily advanced in line of wear. The tool does not "shrink" because of repeated regrinds. As O K bits are obtainable for all metal cutting operations, much of the call for special shapes is eliminated. Yet, when special grinds are needed, they can be quickly made from O K bit stock always available. This same inserted-blade principle is also to be had in Milling Cutters, End Mills, Face Mills, Boring Heads, Reamers and Counterbores.

For best results in these times, we recommend equipping an entire metal cutting department; yet, because of the remarkable degree to which the O K System increases the efficiency of even ordinary operators, the revision of even one machine at a time is definitely worth while!

MODERNIZE WITH TOOLS LIKE THESE

THE O K TOOL CO., SHELTON, CONN.

THE TRADE OK MARK SYSTEM
OF INSERTED-BLADE METAL CUTTING TOOLS



Holding Washers for Drilling

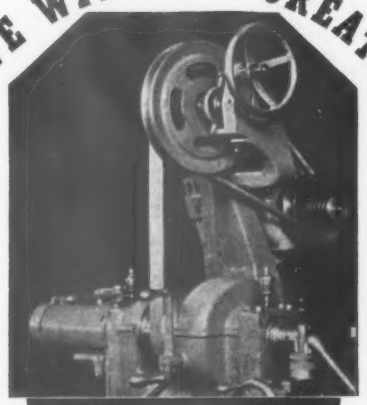
Small Work or Big Work— DE-STA-CO *CLAMPS HOLD*

From small work like washers, to big work like automobile bodies—and for every operation from welding to machining—you'll find a De-Sta-Co quick-acting Toggle Clamp fitted to hold your parts securely, in production, and suited to your manufacturing processes.

Complete range of sizes and detailed specifications are shown in Bulletin No. 41, sent on request.

DETROIT STAMPING CO.
Established Over 25 Years
356 Midland Ave • Detroit, Mich.

INDIVIDUAL DRIVE WITH 30% GREATER SPEED RANGE



GIVEN VARI-SPEED DRIVE

Put a Given Vari-Speed Motor Drive on any machine tool that must be operated at different speeds according to the size and kind of job and you *can select the exact speed instantly without stopping.*

The Given Vari-Speed Drive answers the production challenge of tungsten carbide tools. It alone will use them efficiently at the proper surface speeds per minute. Precision engineered. Perfectly balanced. No vibration. No tool marks. No belt shifting. No gear shifting. No accident hazards. Easy to install. Immediate delivery.

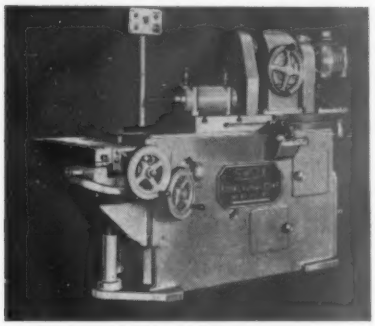
Sold on approval. Money back if not *completely* satisfied in 60 days. Send for bulletin.

GIVEN MACHINERY COMPANY
2024 Santa Fe Avenue Los Angeles, California

a large variety of work, much of it short runs. It is built with the single bed unit, spindle, hydraulic feeding system, and electrical control standard with the Simplex Unit Type Boring Machine. The machine is built by the Stokerunit Corporation, Milwaukee, Wisconsin. The table is mounted on a knee and has a crossways travel with reference to the spindle, which has a considerable forward and reverse movement on longitudinal ways. The combination of these movements with vertical adjustment of the knee makes it possible to bore holes in many places in large castings without making any changes in the set-up.

The advantages derived from the knee and the table mounted on it include: work fixtures of simple design can be used at large savings in tooling costs; a wide range of sizes of work fixtures is permissible greatly increasing the variety of work that can be handled on one machine; and the easily made adjustments for boring holes of differing lengths in many places enable this machine to handle economically short runs that in usual boring practice would carry an almost prohibitive cost for tooling.

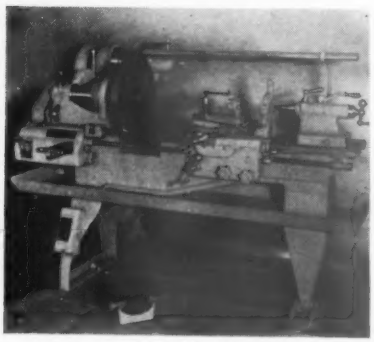
The Knee Type is built in every respect as a precision boring machine, it is said. The spindles are identical with those used in the corresponding sizes of other Simplex Precision Boring Machines. A turret stop permits indexing the spindle to bore a series of holes of differing predetermined lengths. Spindle speed ranges are 300-2700 rpm in the 2U and 200-2000 rpm in the 3U sizes. The heavily constructed knee is held in firm and accurate contact with the bed unit by roller bearings mounted on eccentric studs which can be adjusted to take up all wear. Both table and knee can be equipped with dial indicators and length bars for precision setting when boring a number of holes in one piece.



Simplex Precision Borer

SENECA FALLS MOBILE ENGINE LATHE (F24)

The special star engine lathe offered by the Seneca Falls Machine Company, Seneca Falls, New York, is the standard 14" engine lathe with a removable gap block, but equipped with special legs and motor drive unit for use in Army service trucks. The machine provides a light weight engine lathe capable of handling work with large diameter flanges, and is said to be an ideal machine for repair jobs on rifles, guns, tanks, and motor truck parts which can be repaired right on the field as these



Seneca Falls Engine Lathe

SPEED TREAT STEEL
.40-.50 CARBON OPEN HEARTH X1545
1. MACHINABILITY
170 S.F.P.M.—As Fast as SAE 1112—
Excellent Tool Life and Finish.
2. STRENGTH
3. HEAT TREATMENT
4. DUCTILITY
5. INCREASED PRODUCTION
THANK YOU!
To friends both old and new . . . thanks for your patience. We are doing our very best for Defense . . . and also for you.
Licensee for Eastern States
THE FITZSIMONS COMPANY
YOUNGSTOWN, OHIO
Licensor
MONARCH STEEL COMPANY
HAMMOND • INDIANAPOLIS • CHICAGO
PECKOVER'S LTD., Toronto, Canadian Distributor
MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

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Because they are correctly designed and balanced and are drop forged from tough open hearth steel, heat treated to extreme stiffness . . . because they have alloy steel screws that are hardened at the point to prevent up-setting, and have oversize hub that permit retapping . . . ARMSTRONG Drop Forged Lathe and Milling Machine Dogs ***have double life*** . . . are universally recognized as the finest obtainable. 11 types, all sizes. Write for Catalog.

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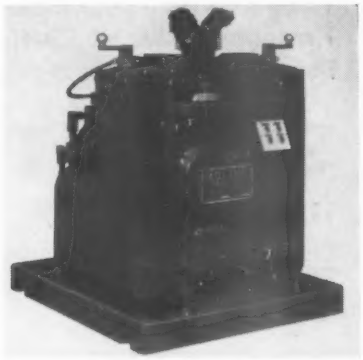
lathes are mounted in mobile repair trucks.

The motor is mounted on a bracket attached to the head leg, and which can also support a swinging member which carries the auxiliary cone. The swinging member may be set in two positions by means of a lever operating a toggle joint. When this lever is pushed backwards, the belt is tight on the two cones. In the forward position, the belt is loose and the operator can revolve the spindle and face plate by hand with very little effort. It is for this reason that the pulley drive was chosen in preference to a geared head machine. The special tailstock leg is designed on the universal joint principle and the unavoidable twisting and weaving of the truck platform cannot distort the lathe bed or throw the lathe itself out of proper alignment. The apron has a safety device so that opposing feeds, longitudinal feed and split nut cannot be engaged at the same time.

MOLINE NO. 24 MILLER (F25)

One of the recently developed machine tools for aircraft production work is the Moline Tool Company, Moline, Illinois, No. 24 Miller which backfaces the bolt holes in the flanges of radial engine cylinders. The design of this machine is such that the driving gears and cams are enclosed and forced lubrication is provided for all of these enclosed rotating parts. Cutting fluid is delivered to the cutters from a reservoir which is cast in the machine column.

Operation of the No. 24 is semi-automatic. After loading the fixture, the operator moves the cutters into position over diametrically opposite holes by means of hand levers. The operating cycle is started by push button to bring a driving spindle up into each of the two cutters to rotate them during the feed cycle. After the cycle is completed and the drivers have withdrawn from the tools, the work is indexed by the operator and the next pair of holes is faced. Indexing takes place without manual withdrawal of the cutters. Such withdrawal by means of the hand levers is necessary only before the work is removed from the fixture. Interlocking of the electrical control with the mechanical features prevents the feed cycle from starting unless the work is properly indexed.



Moline No. 24 Miller

FORGING AND CASTING WELDED STEEL BLANKS (F26)

Among steps being taken to conserve strategically important tungsten, is an announcement by The Forging and Casting Corporation, Ferndale (Detroit), Michigan, of a new line of electrically welded composite steel blanks for the making of dovetail forming cutters for use on automatic screw machines.

The blanks are made by electrically welding, by a special process, a cutting face of high speed steel to a non-hardenable base of mild steel, thus reducing by at least one half the quantity of high speed steel required for a tool

EVERY OPERATOR OF NAMCO TAPS AND DIES NEEDS THIS *New Book!*

Explains and illustrates how to grind, set and use circular, radial and flat chasers for Namco Self Opening Die Heads, Circular Cutter Hollow Milling Heads and Collapsing Taps.

32 pages devoted to chaser grinding procedure, speeds, suggestions on cutting lubricants, tables, practical hints—all taken from field experience in operating thousands of Namco heads.

No foreman or operator who is responsible for the Quality, Output and Cost of Threading and Hollow Milling and Tapping work can afford to be without this first edition manual.

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for OPERATORS of NAMCO Self-Opening Dies Hollow Milling Heads and Collapsing Taps
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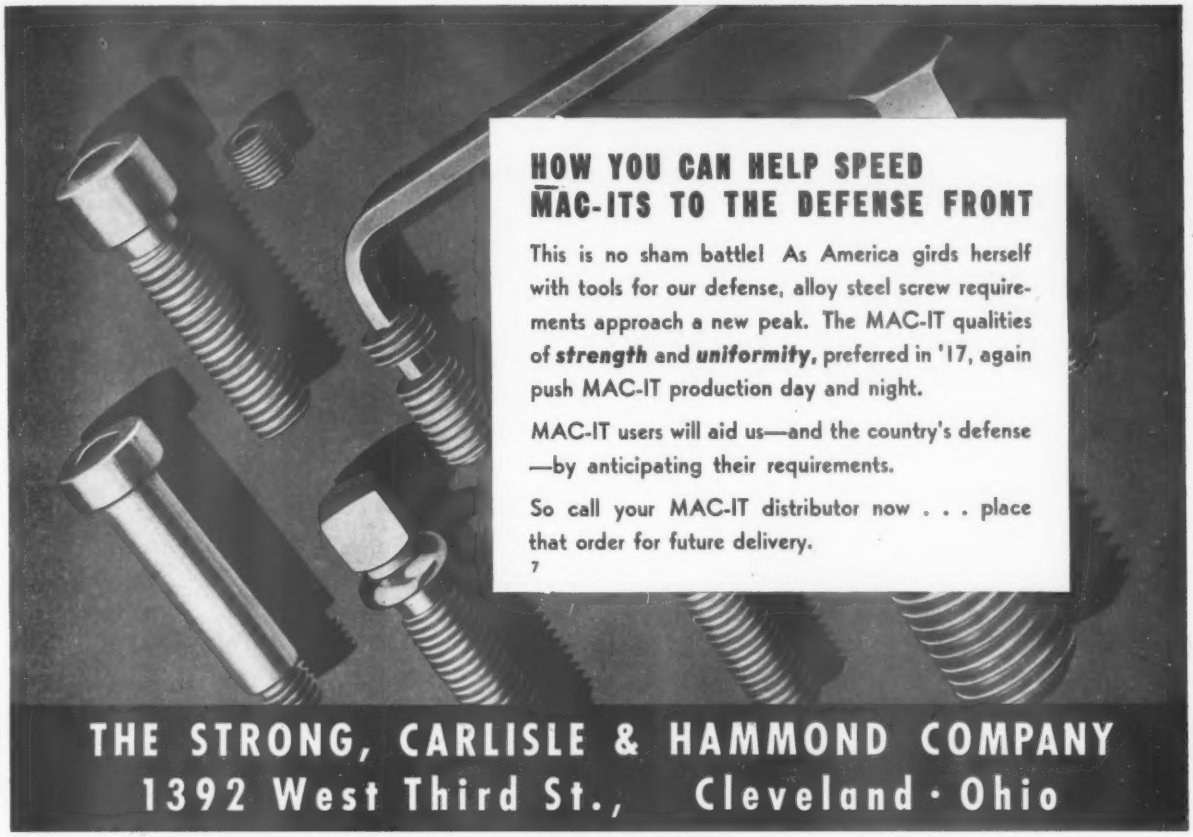

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This is no sham battle! As America girds herself with tools for our defense, alloy steel screw requirements approach a new peak. The MAC-IT qualities of ***strength*** and ***uniformity***, preferred in '17, again push MAC-IT production day and night.

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So call your MAC-IT distributor now . . . place that order for future delivery.

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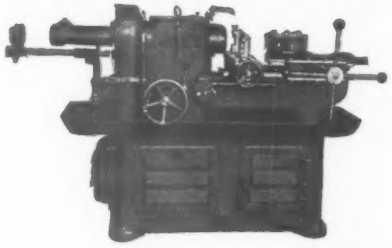
Motor Drive
INFINITE SPINDLE SPEEDS



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SPEEDS from	90 to 1800 R.P.M. or 180 to 3600 R.P.M.	60 to 2100 R.P.M. or 100 to 3600 R.P.M.
CAPACITY	1"x6½" turning length	1½"x9" turning length
	Ask for Bulletin No. 629	*Ask for Bulletin No. 727*

Any spindle speed you want—a direct reading dial shows when you've got it.

Permits the use of carbide tools for fast cutting.

Turret clamps and unclamps automatically.

Equally effective on second operation and chucking work.

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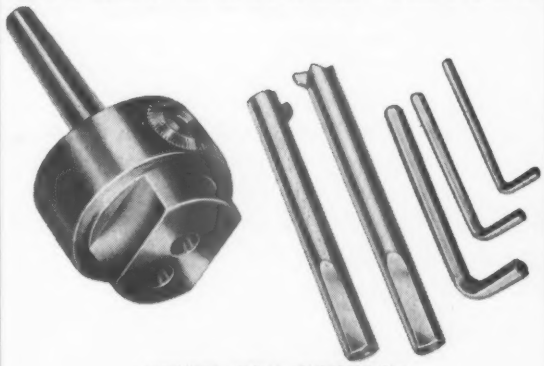
OFFSET BORING HEADS



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"ALL ANGLE"
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of a given size, resulting in a proportionate saving of tungsten.

Unlike some methods of alloy conservation which involve principally the use of substitutes, these composite steel blanks, it is plain, offer distinct advantages of their own over the usual solid high speed steel construction that they replace. Important among these advantages is the fact that the non-hardenable tough base minimizes the inherent tendency of solid high speed steel tools, during heat treating or because of excessive strain when working, to break out at the sharp dovetail corners or at the screw holes where the tools are attached to the holding fixture.

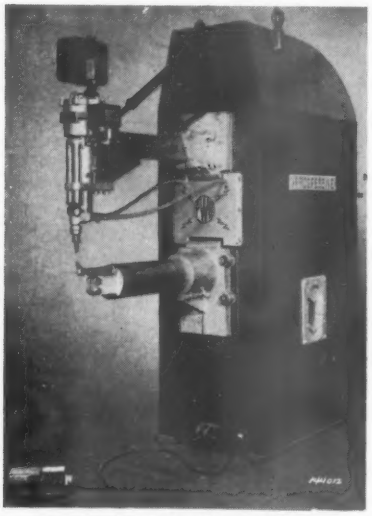
PROGRESSIVE DEEP THROAT WELDER (F27)

To facilitate resistance spot welding inside of deep assemblies, such as tanks of various types, Progressive Welder Co., 3100 E. Outer Drive, Detroit, has introduced a variation of its well-known pedestal welder.

The deep-throat welder has its lower arm built of heavy tubing and fitted with a replaceable adaptor for the lower electrode. The construction makes unnecessary the supporting of the lower arm by means of the usual braces, in turn, makes possible sliding deep assemblies over the arm to full throat depth.

The upper arm, carrying the upper electrode and gun assembly, is braced in the conventional manner. Both upper and lower arms are designed so that they may be adjusted in or out to increase or decrease throat depth as may be required.

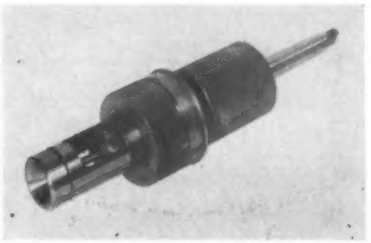
Features of the deep throat welder include elimination of frequently troublesome flexible shunts; positive hydraulic or air-hydraulic pressure at the electrodes; non-magnetic head construction, cutting induction losses; straight-line movement of the upper electrode; provision of non-flicker pressure switch; positive cooling circulation, and others.



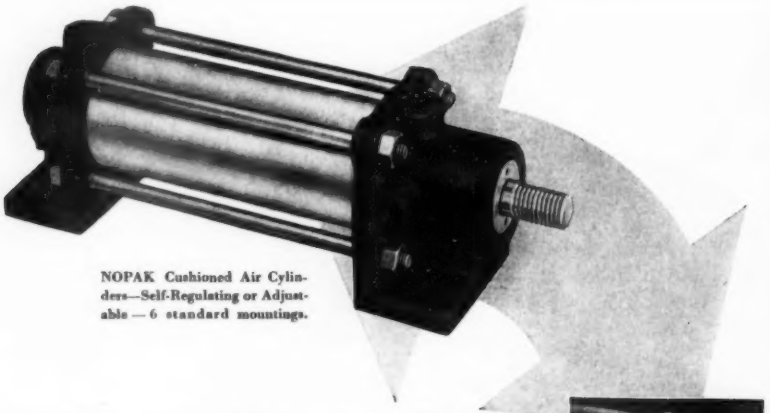
Progressive Deep Throat Welder

UNIVERSAL CENTERING CHUCK (F28)

The Universal Engineering Co., Frankenmuth, Michigan has recently brought out a new tool known as a centering chuck which, it is claimed, makes a centering machine out of al-



Universal Centering Chuck



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Wherever dependable power-movement is needed in your plant to speed up operations, eliminate manual effort, make machines more productive — consider the advantages of NOPAK Air Power Equipment. In terms of efficient performance, economical operation, low maintenance expense and long life, the smooth, unfailing teamwork of NOPAK Valves and Cylinders will prove a profitable investment. Write today for illustrated descriptive literature.

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A molybdenum type high speed steel.

Carbon	.80%
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Tungsten	5.00%
Molybdenum	5.00%
Vanadium	1.50%

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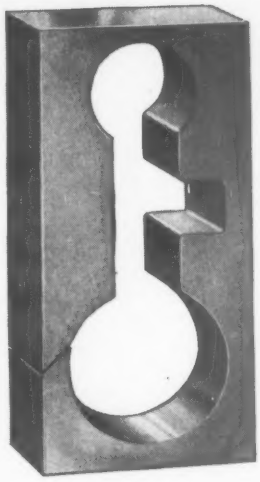


MILFORD PROFILE SAW

. . . for all contour-sawing, jig and band saw machines.

A MACHINE equipped with Milford Profile Saw becomes a most versatile metal-working tool. It will cut complicated shapes, either internal or external, in any machinable substance, and do it in many cases at an amazing cost saving over conventional methods.

Since Milford originated this type of saw in 1886, many specialized "contour-sawing" machines have been developed to use it, **but any good vertical band saw machine with fixtures will do yeoman service.** The saw does the cutting, not the machine.

Under pressure of all-out production, many a shop over the country is using Milford Profile Saw, in jig or band saw machine, to relieve its basic machine tools — drill presses, milling machines, shapers, slotters, lathes, jig borers, etc.

Look into this in your shop, but remember: a machine for contour sawing is no better than its saw. Milford Profile Saw is made by the world's largest, most experienced producer of metal-cutting band saw. Carried in stock by all Mill Supply distributors.

WRITE FOR FREE SAMPLE, GIVING SPECIFICATIONS OF BLADE YOU NOW USE, OR DESCRIPTION OF CUTTING JOB, AND MAKE OF YOUR MACHINE

THE HENRY G. THOMPSON & SON CO., NEW HAVEN, CONN.

MILFORD PROFILE SAW
REZISTOR HACKSAW BLADES

most any medium sized drill press. Bushings are beveled at a 45° angle forming a conical surface that fits over the ends of shafts to be centered. (Chucks are furnished with a set of collets and bushings to fit various size center drills.) The cone locates the shaft centrally and the bushing guides the center drill. There is a feed out adjustment on the chuck to regulate the depth of the center drill so that the centers will be uniform. It is only necessary to chamfer the burrs from the shaft to secure uniform centers with a few thousandths variation in depth. Work from screw machines that has been centered in one end, can be set on a drill press with a center point and the opposite end centered rapidly. A convenient arrangement is provided for removing center drills and guide bushings in a very few seconds, it is said.

EDWARD BLAKE TAP GRINDERS (F29)

The Edward Blake Company, 634 Commonwealth Avenue, Newton Centre, Massachusetts, announces the new No. 1 and No. 2 J-B Tap Grinders and a new J-B Tap Grinder Knee-Room Pedestal. These machines are designed for sharpening taps on the chamfer. They will sharpen 2, 3, 4, and 5 flute taps and may be equipped for grinding 6 flute taps or 6, 8, and 10 flute taps. Both right and left hand taps may be sharpened.

Taps may be inserted or removed from the machine in a few seconds, and a simple locating device insures correct positioning and duplication of work. The desired relief is obtained by a simple screw adjustment of an eccentric mechanism. The motor head unit may be swiveled in a wide arc on any desired chamfer angle. The machines are accurately and ruggedly built, and rapid and positive in operation, requiring little or no special operating training. They are profitable shop tools because substantial savings can be made by sharpening and resharpening valuable taps which formerly had to be discarded, it is claimed.

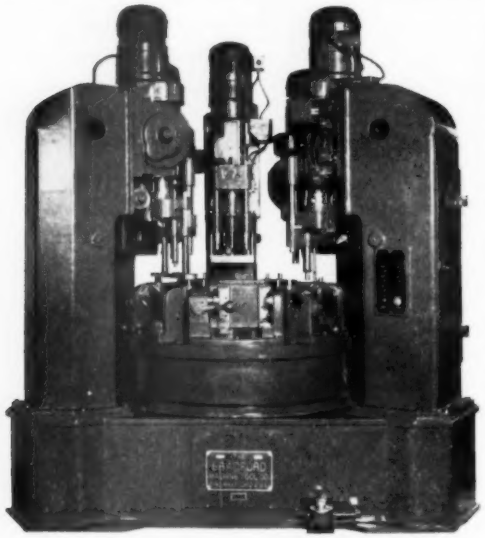
Edward Blake Tap Grinder

J-B Tap Grinders are furnished complete with motor, two grinding wheels, wheel guards, diamond wheel dresser, wrenches, one draw-in master collet, and two bell centers. The pedestal is designed for maximum efficiency for either the seated or standing operator, it is said. Two drawers are furnished for storing extra bushings, wrenches, and other tools.

BOKUM SPOTFACER (F30)

New methods of spotfacing and boring are brought to industry through the introduction of a new product manufactured by the Bokum Tool Co., Detroit. The B & B Spotfacer and boring tool, as it is called, is claimed to perform a wide variety of operations and eliminates many extra tools usually required

Step Up PRODUCTION CAPACITY



A Bradford 5-Unit Machine for drilling, spotfacing, reaming, and tapping automobile transmission cases, performing 1440 operations per hour.

● Meet today's cry for increased production with Bradford Unit Type Drilling and tapping machines. We are "old hands" at building and engineering standard types as well as special machines of the unit type for drilling, reaming, tapping, hollowmilling, spotfacing —simultaneously or in sequence.

Put your problem up to us—send us your prints of parts you want to step up production on —and we'll quote you on the right equipment to do the job *better and faster and at lower cost per piece.*

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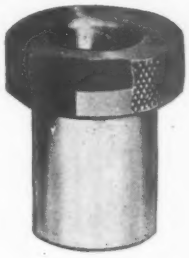
BRADFORD DRILLING AND TAPPING UNITS
Make increased production possible

More and More



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• Machine tool builders who recognize obsolescence as a serious impediment to high speed production, themselves take no chances with such "bottle-necks" and eliminate them as rapidly as they are uncovered. And they remedy that discovery by promptly installing newer, faster machines such as this Model A Cleveland *Single Spindle* Automatic, newest of a battery of 14 such machines engaged in production of small lots and short runs of the various parts of Monarch engine lathes. The Model A Cleveland might help speed up your production. Send for bulletin describing its operating features and capacity and you can make comparisons with your present methods.

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CLEVELAND *Single Spindle* **AUTOMATICS**

to do such jobs. More accurate work can be produced with fewer motions in less time it is said. Heavier cuts can be made in shorter time.

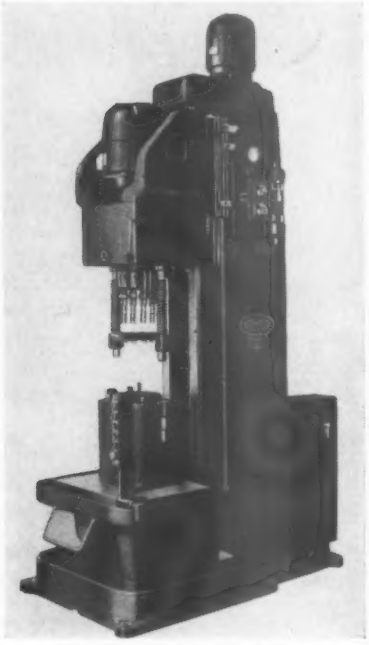
The tool consists of a head (or bar) with cutting blade running through a slot at the end of it at right angles. Located on the head is a dial with micrometer readings which enable the operator to set and lock the blade securely to precise diameter measurements within ten-thousandths of an inch. The tool is made in three models with standard blades providing a range of boring diameters up to twenty-two inches. A wide range of spotfacing is also offered. With the aid of a standard small tool adapter the same tool can be used to bore holes as small as a quarter-inch in diameter.

Bokum Spotfacer

In addition to conventional boring, this new tool shows many advantages in boring long holes in either forward or inverted direction, it is claimed.

BRADFORD HYDRAULIC DRILLER (F31)

A new hydraulic drilling and boring machine has been added to the line of equipment offered by the Bradford Machine Tool Company, Cincinnati, Ohio. This line has been given the name "Holemaster". The column is of nickel iron and of box section type and designed to prevent deflection to a minimum under heavy thrust loads imposed by maximum feeding pressures. The neck is of heavy cast iron construction and is provided with two changes of speed and neutral. A cast iron table of the adjustable knee type may be supplied with the machine if desired. Change gears are of the pick-off style and are mounted on splined shafts. These gears are located at the front upper portion of the neck under a cover. A vertical mounted motor drives both the hydraulic pressure pump and the head drive shaft.



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315 pages — 205 illustrations
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Director of Training
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. . . Simple and easy to read. Contains useful information which commends it to technical men, semi-technical men, and men in the shops who want to improve their ability to make the best use of tools.
Prof. Bradley Stoughton
Dept. of Metallurgical Engineering
Lehigh University

. . . have read and re-read the book. Became absorbed in finding out and learning so many things I never knew before. Chapter 17 on quenching is worth the price of the book . . . will need 45 copies for classroom use.
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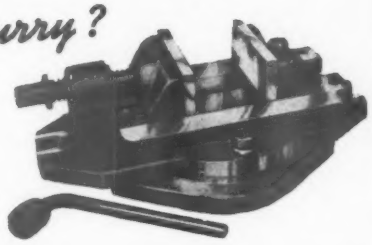

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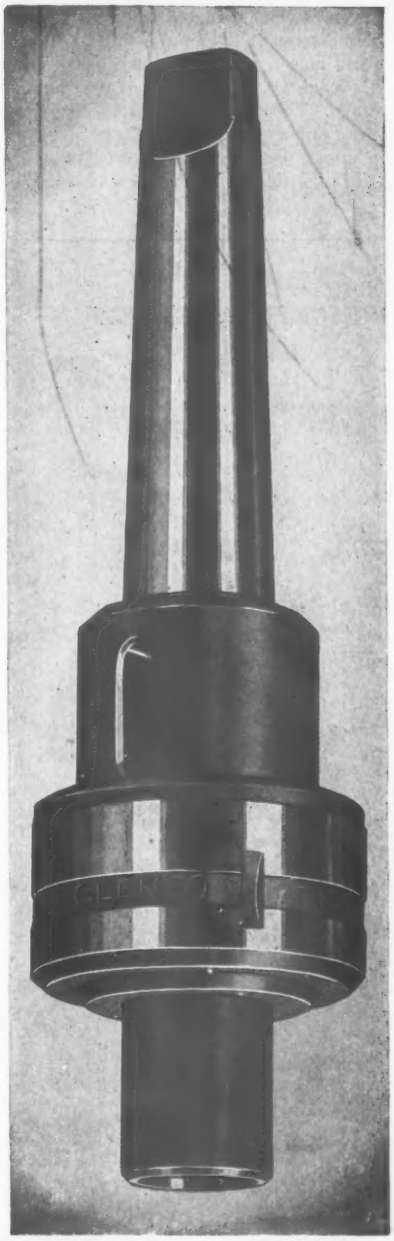

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DETROIT MICHIGAN

tomer. Heads of this type are said to be particularly desirable for high production drilling and boring operations and are especially suited for work requiring a large number of tools of various sizes as it permits the operation of all tools at correct speeds. All spindles are anti-friction bearing mounted when spindle center distance will permit and all gearing and bearings are constantly supplied with a lubricating oil by a circulating system. This system consists of a small gear pump which pumps the oil into the upper section of the multiple head. It then drains through various outlets over all gearing and bearings. No attention is required other than the occasional adding of oil as indicated by the sight gage located in the front side of the box.

OZALID WHITEPRINT MACHINE (F32)

The new Model "C" high speed automatic Whiteprint machine, recently announced by the Ozalid Products Division, General Aniline & Film Corporation, Johnson City, New York, is said to have many distinctive and revolutionary features. Fast printing speed (up to 12½ feet per minute) and uniform exposure, so essential to perfect printing, are assured by a single high pressure mercury vapor lamp.

In the Model "C" the functions of printing and developing are combined into one compact machine which can easily be installed in any office. The machine reduces print making to its simplest form. The operator feeds the original and Ozalid sensitized material into the front of the machine where continuous belts carry both to the printer.

Ozalid Whiteprint Machine

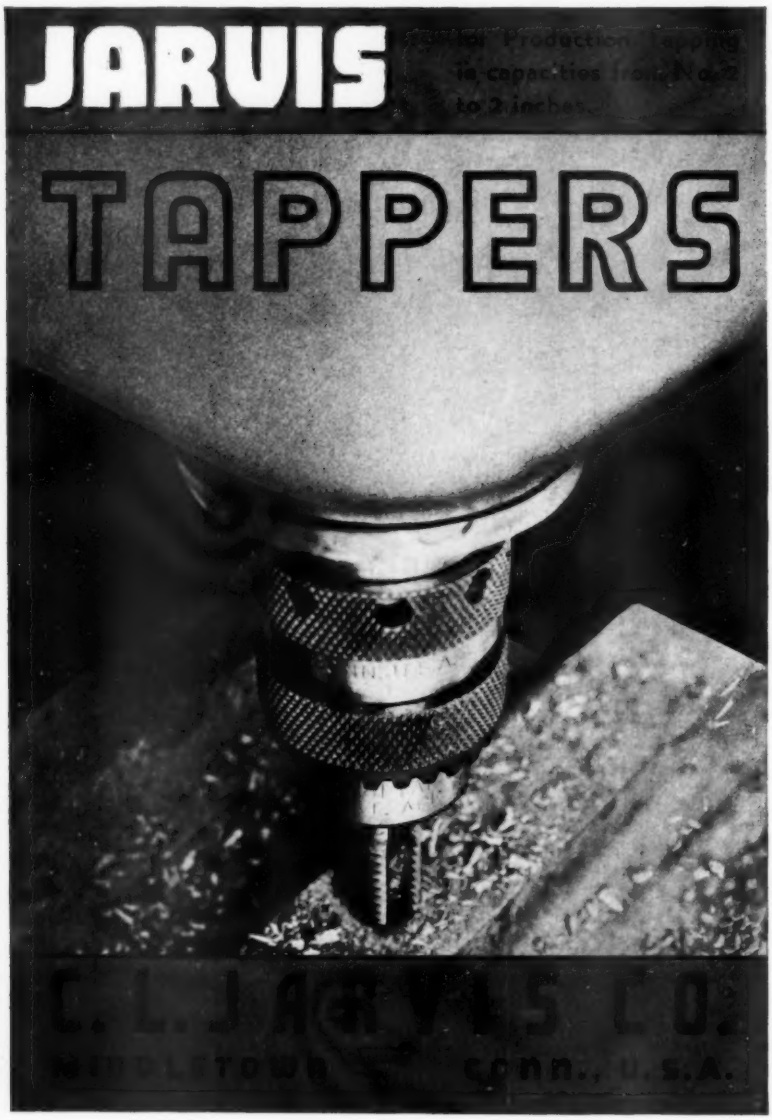
After exposure the original is automatically separated from the print and the original is returned to the operator at the front of the machine. The print is then conveyed automatically to the developer where, after dry development, it is deposited on a delivery tray in the front of the machine, or on a sorting table at the rear of the machine, as the operator desires.

There is an adjustable burner shade to allow variations in light intensity without the necessity of changing the printing speed. This is especially useful when printing long tracings of varying opacity.

GORTON MUNITIONS ENGRAVER (F33)

To ease the strain of producing standard engraving machines, the George Gorton Machine Co., Racine, Wisconsin, has developed a stripped down machine especially for defense work. This machine, designated the Model M-E Munitions Engraver, is now in production.

Both the standard and munitions engravers are being used in defense work to engrave or profile such parts as; gun range scales, indicator plates, gun barrels, airplane propeller pump housings, range finder bands, gun sight dials, gun elevation scales, air temp dials, and



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Superfinished bore straight and round to within .0001 assures accuracy and unexcelled wearing qualities. Black dome. Knurled head. Write for facts.

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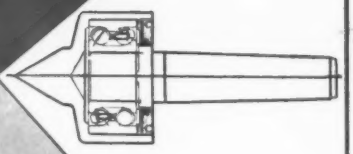

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NEW DEPARTURE BALL BEARING CENTERS

are always dependable for accuracy and rigidity. The exceptional results obtained are due to the double row, angular contact preloaded ball bearings and the ground-after assembly point.

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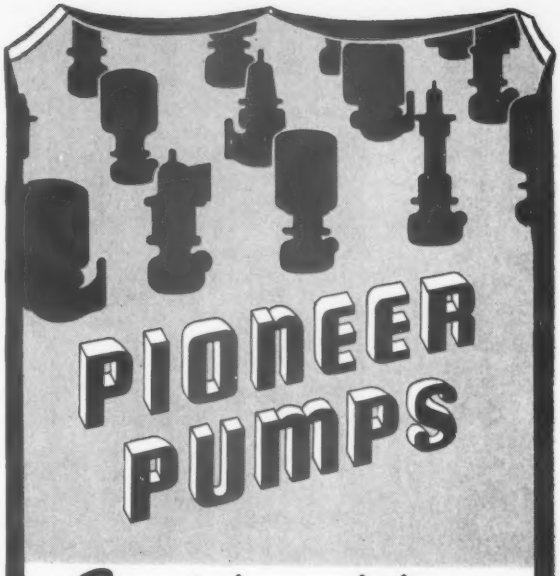

First line defense

★★★ In the leading plants of the country Pioneer Pumps are on guard —supplying a constant flow of lubricant and coolant to the millions of dollars worth of production—protecting tools against harm and equipment against unnecessary "downtime."

Today, both lubrication and coolant must be dependable. You cannot just "think" it is functioning; you must be sure. That's why so many manufacturers prefer Pioneer Pumps; these pumps never fail.

The impeller is designed to the most advanced hydraulic principles, assuring highest efficiency, particularly where maximum heads are essential, or in supplying batteries of machines from a central coolant reservoir. Greater pressures are provided and lower power consumption is achieved.

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many other parts for guns, planes, ships, tanks, bombs, shells, torpedoes and many other armament needs.

By eliminating many of the controls and adjustments necessary to give standard machines their versatility, the Model M-E can be produced nearly three times as fast. This is done without sacrificing accuracy and without impairing the Munitions Engraver's ability to handle the work for which it is designed.

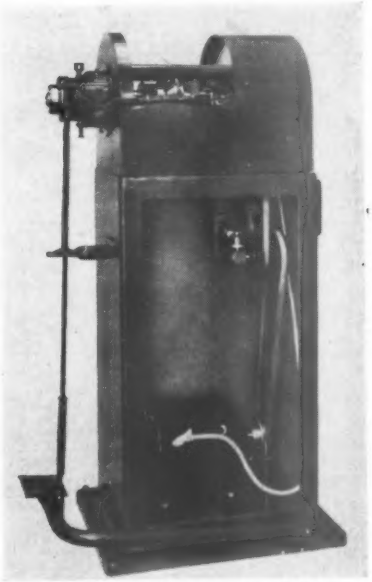
Simplification has been achieved by an improved spindle drive, which does away with several parts and assembly operations, and by providing the Model M-E with a fixed pantograph reduction ratio. Further savings in both materials and labor result from having a table which is only adjustable vertically. This is to provide for differences in the height of work. Stock tools and accessories used with the standard engraving machines are used equally well in the Munitions Engraver, making it unnecessary to buy any special tools, with the possible exception of work holding fixtures.

—USE REPLY CARDS ON PAGE 81—

Gorton Munitions Engraver

SCHAUER VARIABLE SPEED LATHE (F34)

Manufacturers producing small metal and plastic parts requiring accurate lapping or polishing will be interested in the new Schauer ideal variable speed lathe. Speeds as low as 20 rpm, plus ample power for heavy work, at speeds up to 4000 rpm are obtainable. These speeds are in a ratio of 5½ to 1, based on the lowest speed desired by using a single-speed motor,



Schauer Variable Speed Lathe

or 11 to 1 with a two-speed motor. Motor is spring-mounted in base; thus automatically controls belt tension. Automatic brake on spindle applies when foot treadle is depressed to open the motor circuit. Spindle is equipped with 3 or 4 jaw chuck, or special holding fixtures to meet individual requirements.

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Reclaim your CUTTING TOOLS
Everytime they become dull.
Get long, full service thru
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Diamond Tools for WHEEL DRESSING

Dependable IN OPERATION

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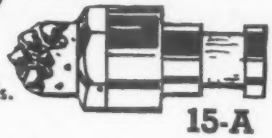
Contain finest quality Brazilian diamonds.



20-A

15-A

There is a tool for every grinding application, faultlessly crafted, efficient in operation. Each diamond is carefully selected for hardness, size, shape, and structure. The improved holding medium and the FORCED METHOD of mounting insure perfect application, low initial investment, and lower dressing costs.

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Well, one way is to eliminate "bottleneck" hand jobs —such as ***hand sanding!***

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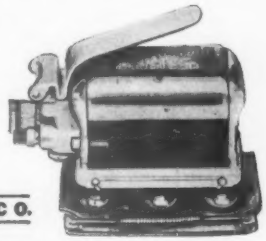
That's why so many manufacturers in all kinds of industries have turned to "SANDY" to ***TRIPLE*** the speed of finish-sanding. We may be able to help you overcome bottlenecks caused by inadequate manpower, and thereby bring about ***important savings*** in your production costs. Put "SANDY" to work in your shop.



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New Literature

Of Interest to the Tool Engineer

(248) Grinding

Specifications New Cincinnati Hydraulic Universal Grinding Machines. 16 pp. Cincinnati Grinders Inc., Cincinnati, Ohio. This folder illustrates, describes and gives the specifications of the 14", 16", and 18" hydraulic universal grinding machine.

(249) Metal Cutting

Chip Formation, Friction, and Finish. 48 pp. By Hans Ernst and Eugene Merchant. The Cincinnati Milling Machine Co., Cincinnati, Ohio. This book contains the latest research findings in metal cutting of the research department of the Cincinnati Milling Machine Co. The paper presents a further step in the development of the study of chip formation and sets forth the beginning of a quantitative treatment of the metal cutting process.

MILLING
Ease of operation, quickly changed cutters, quick reading dials provide for efficient milling operations on this 20" x 25" steel plate.
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Timken mounted spindle and accurately fitted rigid table furnish power and accuracy for this face milling cut.
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Boring operations on this 29" x 18" plate get accuracy and speed from dial indicators, accurate spindle and square table slides.

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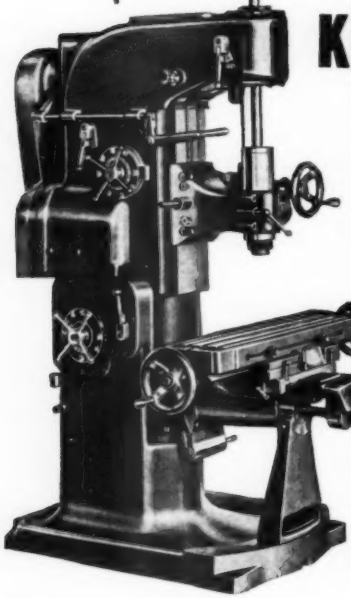

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(250) Contour Sawing

Contour Sawing Hand Book. 158 pp. Continental Machines, Inc., Minneapolis, Minnesota. This handbook contains complete information on the art of contour sawing and its application. It should greatly assist in the training of such operators, as well as being a reference guide. The book is bound, indexed and covered in textbook style.

(251) Cylinders

Nopak Cylinders. 12 pp. Galland-Henning Mfg. Co., Milwaukee, Wisconsin. This folder describes in detail the Nopak Cylinders, which are designed for air or hydraulic service.

(252) Feed Fingers

Morrison Style "B" Master Feed Fingers and Pads. 4 pp. Hardinge Brothers, Inc., Elmira, New York. This folder clearly presents the advantages of the Morrison Master feed fingers in comparison with the conventional solid feed fingers, and gives complete ordering information and prices.

(253) Diamond Tools

No Resetting, No Lost Diamonds. 6 pp. Dia-Tool, Inc., Yonkers, New York. This folder describes and prices Series A, B, and C diamond wheel dressers. Illustrates special holders for various types of machine tools.

(254) Lathe Catalog

South Bend 9-Inch "Workshop" Precision Lathes. 56 pp. South Bend Lathe Work, South Bend, Indiana. Two new models of the 9" precision tool room lathe are described in this catalog, as well as the 26 other types making up the balance of the 9" line. Among the uses for these lathes are production operations on precision parts and tool room work. All attachments, tools, and accessories for use with these lathes are shown.

HOW TO ORDER

Booklets listed in this department and identified by a key number preceding the heading may be obtained by using the postcard on page 81. No postage is required.

(255) Tap Grinding

The J-B Tap Grinder. 4 pp. Edward Blake Co., Newton Centre, Mass. This folder gives a complete description of the J-B Tap Grinder line, and includes illustrations and specifications of the machine.

(256) Honing

Sunnen Precision Honing Equipment. 12 pp. Sunnen Products Co., 7932 Manchester Ave., St. Louis, Missouri. This machine because of its low cost, great adaptability, and the fact

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Accurate—simple for toolroom manufacturing. Self-contained motor drive.

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For hundreds of difficult grinding jobs, nothing compares with the HI-POWER — a constant service tool that gives smooth, precision performance. Has ample power to drive a 2½" diameter wheel. 17,000 r. p. m. Wt. 3 lbs. In wood case, with accessories, $35.00.

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Actually cut grinding costs ⅓ to ½. Made of V/T Super Bond, the toughest bond made —will stand up under the most exacting conditions. Hold their shape and grind more pieces per wheel faster and without sacrifice to cutting action.

TEST WHEEL—Try one free. Tell us kind of job, grinder you use and size wheel preferred.

HANDEE TOOL OF 1001 USES

The little Caesar of grinders. Also drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, etc. De Luxe model 12 oz. 25,000 r. p. m. Fits any A.C. or D.C. socket. With 7 accessories, $18.50.

IMMEDIATE SHIPMENT
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that it does not require a skilled operator is said to be used throughout the defense industry.

(257) Flexible Shafts

Walker-Turner Flexible Shaft Machines. 8 pp. Walker-Turner Co., Inc., Plainfield, New Jersey. This brochure completely describes the various flexible shaft machines available for use in grinding, polishing, burring, and for a host of other operations necessary in the manufacture of airplanes, airplane engines and parts, marine engines and accessories, in the automotive field, in general machine shops, foundries, and die shops.

(258) Engraving

New Gorton Munitions Engraver. 4 pp. and insert. George Gorton Machine Co., Racine, Wisconsin. This booklet gives the machine specifications, samples of work with production times, accessories, assembly and lubrication charts, and an actual size work chart which permits a prospective machine purchaser to determine whether a job in mind will fit the machine.

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YOU can always recognize a McCrosky Adjustable Boring Block by the V-shaped slot in the center of the block. It is an important part of the McCrosky Centralizing V-Lock that delivers important advantages to your boring jobs. This lock permits the operator to control accurately the amount of block-float for the finishing cut. It also permits blocks to be interchanged without removing the centering key from the bar. Just two of the reasons why McCrosky Boring Bars perform accurately and save time.

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McCROSKY TOOL CORPORATION
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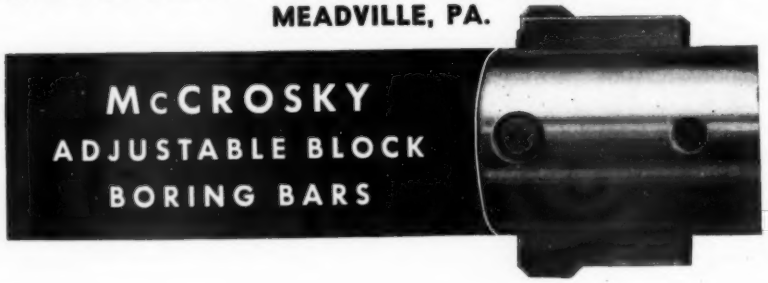

(259) Grinding

New Carboloy Grinder Bulletin. Carboloy Co., Inc., Detroit. This bulletin, in addition to giving complete specification of the various Carboloy tool grinders, also contains illustrations on adjusting grinders, methods of using grinders, and complete specifications of recommended accessories, such as wheel, special tool rests, and tool blocks.

(260) Cone Drive

Why Cone-Drive. 12 pp. Cone drive Division, Michigan Tool Co., Detroit. This booklet contains considerable information not previously published, including illustration of numerous installations, details on how Cone-Drives are produced, specifications of speed reducers, and a discussion of gearing in general.

(261) Solenoid

Machine Tool Solenoid. 2 pp. John S. Barnes Corp., Rockford, Illinois. This folder announced the new improved solenoid designed primarily for machine tool use. It lists the advantages and gives the specifications.

(262) Electric Drills

The Fast, Modern Way to Drill. 6 pp. Independent Pneumatic Tool Co., 280 S. Jefferson St., Chicago, Illinois. This bulletin shows the latest U14 type ¼" capacity, small, light, one-hand electric drill, presenting a complete range of models, motor sizes, speeds, and switch styles.

(263) Aluminum

Forming Aluminum 1941. 56 pp. Aluminum Co. of America, Pittsburgh, Pennsylvania. This booklet gives detailed information on drawing, spinning and other aspects of Aluminum fabrication. It is attractively illustrated and has a convenient spiral binding.

(264) Aluminum

Aluminum in Aircraft. 104 pp. Aluminum Co. of America, Pittsburgh, Pennsylvania. This book contains basic information on the use of aluminum in the aircraft industry and is intended primarily for the newcomer who wants to obtain a general picture of the use of aluminum in aircraft, rather than for the veteran aircraft manufacturer.

(265) Salt Baths

Ten New Ways to Save Time and Labor with Holden Heat Treating Baths. 8 pp. The A. F. Holden Co., New Haven, Conn. This folder describes Holden Pot Furnace, Oil, Gas, and Electric. It discusses special methods and equipment, that have been designed and developed as a result of con-

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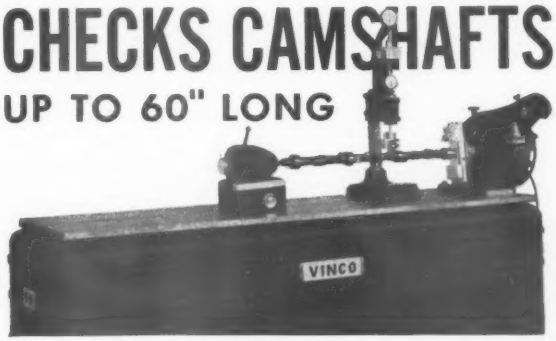

Illustrated above is the Vinco Cam Comparator in use on the Vinco Optical Master Inspection Dividing Head. With this equipment, an extremely accurate check can be made of the amount of rise and fall and angular relation of cams on automotive or aviation camshafts or on aviation cam discs. Camshafts up to 60" long can be checked.

The Dividing Head, used individually, is unequalled for the final inspection of spacing, angular locations or similar characteristics of gear teeth, master index plates, splines, etc. It is highly accurate . . . . simple in operation . . . . absolutely dependable . . . . compact and sturdy in design and construction.

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STAINLESS & COPPER FORGINGS

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tinuous study and research in the salt bath field.

(266) Thermocouple

Wheelco Thermocouple Data Book and Catalog. 32 pp. Wheelco Instruments Co., Harrison & Peoria Streets, Chicago, Illinois. This booklet contains a number of valuable tables as well as prices and description of the complete Wheelco line of thermocouples and thermocouple accessories.

(267) Bearings

Torflex Flexible Bearings. 8 pp. Harris Products Co., 5433 Commonwealth Avenue, Detroit. Data includes the radial loads, radial and axial deflections, rubber wall thicknesses, etc. of stock sizes available from ⅛ to 5 inch diameters. Also shown are some typical applications.

(268) Shop Equipment

Lyons Steel Shop Equipment. 40 pp. Lyon Metal Products, Inc., 3125 Clark Street, Aurora, Illinois. This catalog illustrates such steel shop equipment as work benches, stools, stock, and tool charts, tool cribs, cabinets, and numerous special purpose products.

(269) Shears

Quickwork-Whiting Rotary Shears. 8 pp. Quickwork-Whiting Division, Whiting Corp., Harvey, Illinois. This folder describes the features of, illustrates, and gives the specifications of the Quickwork line of rotary shears.

(270) Insulators

B. F. Goodrich Vibro-Insulators. 12 pp. B. F. Goodrich Co., Akron, Ohio. This catalog section is illustrated with both actual installation pictures and engineer's drawings of each type of Vibro-Insulator manufactured. General discussion of the part played in combating noise and vibration is given as well as methods of selecting the proper vibro-insulator.

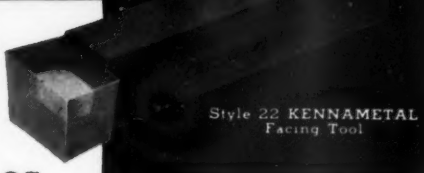
(271) Salt Baths

Heat Treating by Electrothermic-Permeation. 8 pp. Upton Electric Salt Bath Furnace Division, Detroit. The method of operation of the new principle employed in the Upton Salt Bath is explained in this folder. The method is especially suited for the hardening of the various Moly high speed steels.

(272) Alloy Steels

Ry-Alloy Oil Hardening Steel. Joseph T. Ryerson & Son, Inc., Chicago. Literature is now available on the Ryerson Ry-Alloy used for high hardness with oil quenching, and for deep penetration with minimum distortion or deformation. It is said to be easy to machine and to hold a fine cutting edge under rough treatment.

How KENNAMETAL CARBIDE TOOLS Simplify Tool Set-Ups on Turret Lathes



Style 22 KENNAMETAL Facing Tool

When replacing high speed steel tools with KENNAMETAL tools, it will be found that KENNAMETAL not only reduces actual machining time but also simplifies tool set-ups because fewer tools are required. How this works in the case of turret lathes is illustrated in Figs. 1 and 2.

Fig. 1 shows two high speed tools used to remove the metal indicated by the dotted line. Due to the exceptionally wide cut involved, the tools had to be used at a low speed (60 ft./min.) and a light feed (.005"/) to avoid chatter. Production time per piece was 2.3 minutes, while considerable time was consumed in setting up tools after sharpening to hold shoulder dimensions.

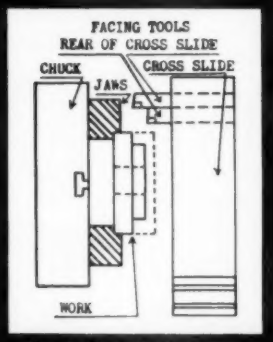


Fig. 1. Gang tools on rear of cross slide.

In Fig. 2, a single KENNAMETAL Style 22 tool is used first to machine the outside face of the work and then to face the shoulder to the proper diameter. A parallel having the same width as the shoulder on the work is inserted between the "Stop" and the pin on the cross slide prior to the first operation, and is removed for the second operation. The KENNAMETAL tool cut at 325 ft./min. and .012" feed, with a production time of only .9 minutes as compared to 2.3 minutes under the former set-up. Resetting with a sharpened tool was a matter of seconds.

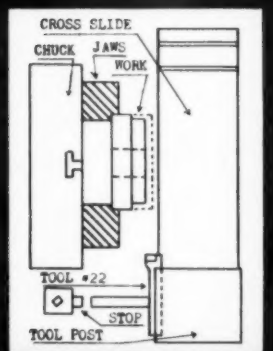


Fig. 2. Style 22 KENNAMETAL tool in front tool post.

We will gladly show you how KENNAMETAL steel-cutting carbide tools can reduce tool set-up time . . . increase production . . . on your turning, boring, and facing jobs. Send us your drawings or B/P's.

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FOREIGN REPRESENTATIVES: U. S. STEEL EXPORT CO.
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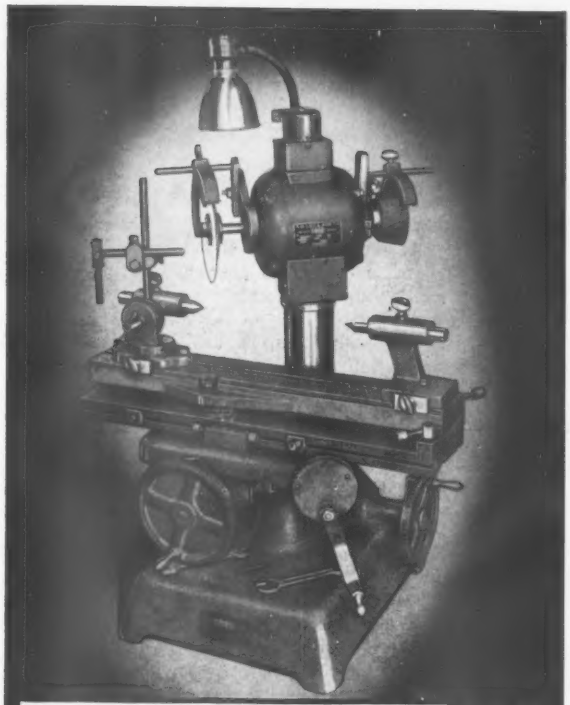
NEW BOOKS

Hydraulic Machinery by E. Molloy. 96 pp. $2.00. Chemical Publishing Co., Inc., 234 King Street, Brooklyn, New York. This book deals with the design, application, operation, and maintenance of hydraulic presses and shears, including those used in the manufacture of armaments. The book first gives a study of the theoretical principles of hydraulics and their application. In subsequent chapters it discusses forging presses, hydraulic presses used in the manufacture of guns, projectiles, and armour, special forging presses used in the manufacture of railway material, hydraulic presses for miscellaneous duties, and hydraulic shearing machines. The book is illustrated with 50 photographs and diagrams.

Aerosphere-1941. Edited by Glenn D. Angle. 948 pp. $10.00 plus postage. This book is filled with facts upon the entire world's aircraft both civil and



The New Model A600 Tool and Cutter Grinder

Our bulletin TCG41-9TE will give you all the details.

K. O. LEE COMPANY

Aberdeen, South Dakota ★ U.S.A.

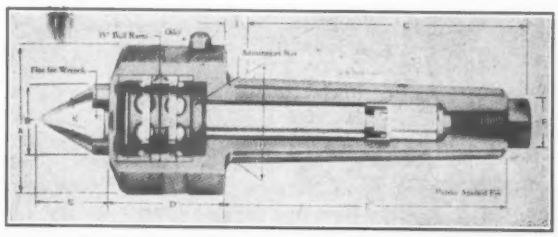
The Improved Nielsen Live Centers

LOAD CAPACITY—200 TO 40,000 LBS. AT 100 RPM.

HAVE ADJUSTMENT TO TAKE UP WEAR AND PRELOAD BEARINGS

STANDARD MORSE TAPER No. 2 TO 6 IN STOCK

WRITE FOR CATALOGUE AND DISCOUNTS



NIELSEN, INCORPORATED

LAWTON, MICHIGAN

Unskilled labor can do fast, accurate tapping on this

Ettco-Emrick FOOT-OPERATED TAPPING MACHINE

IN the face of today's shortage of skilled labor, this big advantage of the Ettco-Emrick Tapping Machine is a life-saver.

And here's why no special skill or educated touch is needed—Ettco-Emrick design ***eliminates the human element from the actual tapping operation.*** An exceptionally sensitive friction - clutch drive combined with an accurately balanced foot - operated gravity feed does the job. The operator's part is confined to feeding the work—for which both hands are free—and pressing the foot pedal—which requires so little effort he can do it all day without fatigue.

IS YOUR PRODUCTION UP TO THESE FIGURES?

2400 tapped holes per hour is readily maintained on the Ettco-Emrick with the standard 2-spindle head as illustrated. And with interchangeable Ettco-Emrick Multiple Heads, available with spindles up to 12, production can be stepped up to ***12,000 holes tapped per hour.***

GET THE FACTS

BULLETIN No. 4 gives you the complete story about the Ettco-Emrick Foot - operated Tapping Machine.

BULLETIN No. 3 gives full details about the Ettco-Emrick Multiple Heads. Write for your copies today.

• **ALWAYS AT YOUR SERVICE**—our 25 years specialization in machine tapping, to help solve your tapping problems. Send details.

ETTCO TOOL CO.

586 Johnson Ave., Brooklyn, N.Y.

DETROIT • CHICAGO

The Famous Ettco-Emrick DRILL CHUCKS • TAP HOLDING CHUCKS
TAPPING ATTACHMENTS • TAPPING MACHINES
MULTIPLE SPINDLE TAPPING AND DRILLING HEADS
Unexcelled for Design, Materials and Workmanship

military. The editor was formerly Professor of Mechanical Engineering at the Lawrence Institute of Technology, and once engineer in charge of aircraft engine design, U. S. Army Air Service. The four sections of the book are devoted to modern aircraft, modern aircraft engines, aircraft statistics, and buyer's guide. In the section on production of planes there are 553 photographs, cut away and sectional drawings of planes now being built throughout the world by 265 manufacturers. Private, commercial and military planes are included. On each plane information is given as to the specifications, the method of construction, the standard equipment included, instruments, performance data and the type of engine used.

The section on engines includes 269 photographs and illustrations of engines of 118 manufacturers. It includes power plants for light planes, as well as, for larger aircraft. The section includes a discussion of engines now under development as well as those in use at the present time.

The section on statistics contains facts and figures on passenger models, speed and endurance records, CCA Schools, accidents, engine production, from all over the world. It covers air-carrier, mail, express, and private flying operation.

The buyer's guide has an up-to-date listing of names and addresses, principal personnel and products made, of all firms engaged in every phase of aeronautics throughout the world. There is a listing of manufacturers of all products used in aeronautics. American manufacturers are listed geographically.

This book presents the most exhaustive treatment of the aircraft industry ever printed. The material is well written, and easily located in the book.

The Starrett Book for Student Machinists. $.75. 184 pp. The L. S. Starrett Co., Athol, Massachusetts. This book combines much of the material formerly published in two well known Starrett books. *(The Starrett Book for Machinists' Apprentices,* and *The Starrett Machinery Data Book.)* It contains over 200 diagrams and photographic illustrations and 30 reference tables. Included are chapters on such subjects as: How to read working drawings, precision tools and measuring practices, how to read a micrometer and a vernier, fits and limits of tolerance, bench work, chipping, filing, metal sawing, drilling, lathe work, screw threads and tapers, tool-making, jigs and fixtures, and other valuable material.

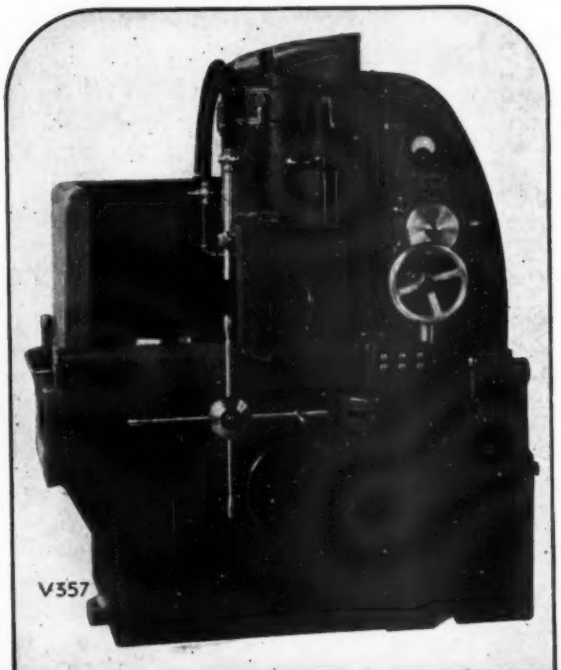
No. 11 BLANCHARD

For accurate, safe, rapid grinding of small parts in tool work or production.

The No. 11 has the power and rigidity for fast accurate work. It grinds from the rough, removing stock quickly and economically. It finishes to close limits of size and flatness. A fine finish, measuring only a few microinches, can be produced on this machine.

Investigate the savings possible in your work. Send samples and tell us your requirements; no obligation.

Send for this catalog fully describing the No. 11 Blanchard Grinder.

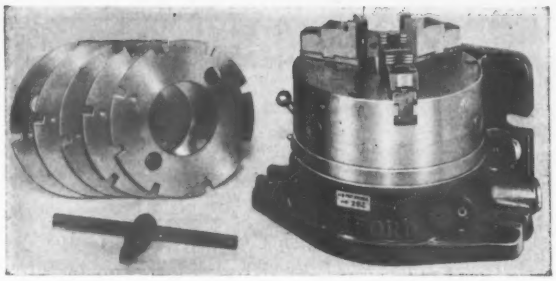


THE BLANCHARD MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASSACHUSETTS, U. S. A.

Election Results for New ASTE Board of Directors

During the recent election of Regional Directors the following men were elected to serve on the Board of Directors of the American Society of Tool Engineers:

Region 1 (Detroit and Western Michigan) Don T. Flater; 2 (Racine and Milwaukee) Eugene Bouton; 3 (Cleveland and Toledo) C. V. Briner; 4 (Tri-Cities and Peoria) J. E. Gilchrist; 5 (Chicago and South Bend) C. G. Ross, 6 (Worcester and Boston) C. John Lindegren; 7 (Hartford and Springfield) I. F. Holland; 8 (Pittsburgh and Central Pennsylvania) W. B. Peirce; 9 (Elmira and Binghamton) C. D. Thomas; 10 (Buffalo and Toronto) George J. Keller; 11 (Twin States and Rockford) Glen Roberts; 12 (Columbus and Indianapolis) Stanley Mack; 13 (Baltimore and Philadelphia) Nils H. Lou; 14 (New York-New Jersey and Greater New York) P. W. Brown; 15 (Los Angeles and Golden Gate) D. C. Jones; 16 (Rochester and Syracuse) Cecil Lucas; 17 (St. Louis and Houston) Ernst Nieman; 18 (Dayton and Cincinnati) Earl V. Johnson; 19 (Schenectady) Fred Diehl.



Low Cost Indexing

Here is an accurate, fool-proof, fast and efficient spacing device for your milling, drilling, jig-boring, slotting, grinding and other jobs requiring fast, accurate indexing.

It is being used in tool rooms and in production plants with marked success and the approval of Tool Engineers everywhere.

A practical way to minimum unit costs with MAXIMUM production

Get the facts—today

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD, CONN.

Having difficulty holding tolerances?

DEMAND THE

ZIEGLER

ROLLER DRIVE

Floating Holder

for

Taps and Reamers

FLOATS RADIALLY

AUTOMATICALLY compensates for machine spindle misalignment, eliminating over-sized or bell-mouthed holes.

Helps produce unbelievable accuracy on both new and old equipment.

Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.

W. M. ZIEGLER TOOL CO.
1920 Twelfth Street DETROIT

How to Save Tool Steel to help National Defense

The steel used in APEX-Phillips Power Bits is the finest obtainable for the purpose and is vital in Defense.

And, as long-lived as APEX Power Bits are, they do wear out eventually.

Now, instead of discarding them in favor of new ones, do this:

Return your worn APEX-Phillips Bits to us. We will recondition them so that they are as good as new. Each reconditioning shortens the Bit approximately 1/8", but it is as serviceable as a new one. The longer Bits can be reconditioned time and again until they become too short for use in a power driver.

The cost of reconditioning is substantially less than that of a new Bit.

For Defense sake, don't discard APEX-Phillips Power Bits—send them in to us for reconditioning.

APEX
—PHILLIPS POWER BITS

are FIRST for lasting qualities

The APEX MACHINE & TOOL Company

1101 Patterson Blvd. **Dayton, Ohio**

(Continued from page 78)

that the blot of craven and traitor can be entirely erased from its escutcheon.

▼ ▼ ▼

Coming back to the main trail, after having wandered the by-ways, I concede all the possibilities of invasion as outlined by Mr. Carpenter—IF. If Hitler tames the Russian bear and becomes undisputed ringmaster of continental Europe, and if he twists the tail off the British Lion and, thereby, becomes Lord High Admiral of Europe's combined navies and maybe Nippon's to boot. (One mustn't overlook the imitable Japs). But all that regardless, I hold America invincible provided that we unite on essentials instead of squabbling over a technical neutrality or who is going to get the sugar from American labor. Then, if it comes to a fight, we'll be ready for any foreign potentate with a yen to make us something what we ain't. For that matter, there are plenty right here at home trying to do that. But prepared, it would take the fury of all hell to prevail against us. Oh sure, I'm optimistic—aiming at the moon!—but why not? Anyone can shoot down a well, which by no means implies that one should go hunting big game with a popgun.

▼ ▼ ▼

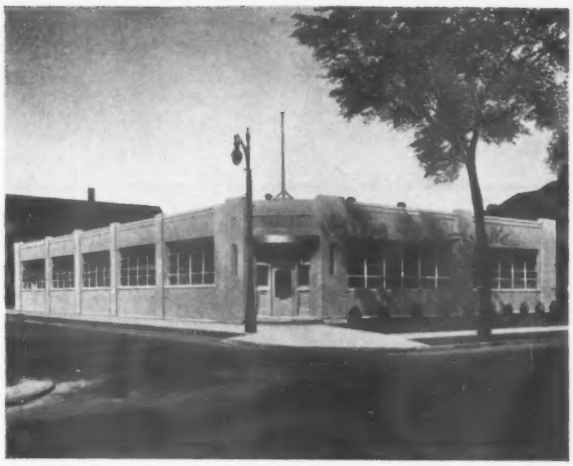
You know, in our anxiety over our defenses, and in our impatience with delay, we are quick to effect comparison with defunct European democracies. "Look at France!—the mightiest military nation on earth, collapsed not so much by enemy might as by internal rot, by dissension from within." And: "There's England, muddling along, steeped in tradition and promoting its military leaders by seniority (even as we do) the while the enemy flouts tradition and promotes by merit (as we should)". Yes, but England is learning, and fighting valiantly in the meanwhile, and we can learn, too, from the mistakes of others. We must, to successfully contend in an age of international outlawry. But, why look at France, a negative yardstick, when there are positive gages by which to effect comparison? Look at the Finns, who conceded a slice of territory as an alternative to annihilation by a colossus, and at the Greeks, whom it took two great powers to vanquish after they had won a war from the one. And let us consider that there is infused into our national entity all of the valor of minority races, all of the distrust of authoritarianism of Americans by choice, plus the American will to fight for what is right, and we need not fear for our ramparts of men. And let us look at Sweden, with limited natural resources but with unquestioned industrial and engineering efficiency, and let us consider that we have, unlimited resources and the undisputed industrial leadership of the world. Let us further consider that we have at our command the skill and ingenuity of trained immigrants and their seed, plus American initiative and inventive genius which all the regimentation under which we chafe cannot suppress, and certainly there is ground for optimism. And gentlemen, optimism is the spark plug of achievement, even, as will is the fuel of power, But now, let us step on the gas! We're off to a late start.

Yours Handily,

Our big job today is to turn out Greenlee Automatic Screw machines just as fast as we can . . . but it's also part of our job to see that every Greenlee Machine is built right to insure maximum speed and dependable accuracy day after day. We're working fast, but not too fast to make sure that the Greenlee Automatics, built to meet today's urgent demand for high-speed production machinery, have the same skilled craftsmanship, the same high-grade materials, the same high standards of inspection, and the same precise accuracy that went into every Greenlee Automatic produced before this emergency.

GREENLEE BROS. & CO.
ROCKFORD ILLINOIS

An Important New
SERVICE
is now offered to readers of
THE TOOL ENGINEER
See Page 81 for details!



***Above:* Flag raising at the new plant at the Detroit Broach Company. *At left:* New Building of the Putnam Tool Co.**

Employees Present Flag To Detroit Broach

Marking the completion of the new home of the Detroit Broach Company on Sherwood Avenue in Detroit, was the presentation to the company of a flagpole and flag by the employees. At the ceremony which took place in front of the plant, Howard Armstrong representing the employees, raised the flag and it was accepted by Gustav von Reis, president of the company.

This new plant, which is thoroughly modern in architectural treatment, will triple the former floor area. In the front of the building is a spacious, well-lighted drafting room, in addition to the offices and reception room. Three production aisles provide flexibility for the accommodation of straight line layouts.

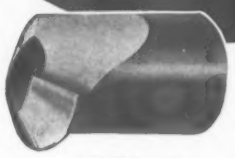
Putnam Tool Addition Completed

The Putnam Tool Company has completed a new plant which, from the standpoint of industrial construction problems, is quite unique.

The original Putnam plant, occupied when the company was first organized only seven years ago, was a small shop fronting on Charlevoix Avenue. In 1939 an addition extending from the back of the shop to McDougall Avenue was erected.

To make room for the present expansion, the building on the corner was purchased and razed. The entire shop layout was changed and to create a harmonious architectural effect, all existing exterior walls were removed and replaced. During the period of remodeling and new construction, production went on as usual, even at times when tarpaulins served as exterior walls and even as a roof.

Life of one of these tools equals that of six normally-forged tools



STYLE A — *for general boring*

STYLE B — *for facing and bottoming*

STYLE C — *for internal threading*

. . . show excellent performance on high production work, on difficult-to-machine jobs as well as the average jobs

Make precision boring and internal threading easy and economical. Accepted for their high efficiency in the leading plants of the country. Specially designed of super-high speed steel. • All styles available also with carbide tips.

Write for detailed folder A-1139 giving complete information

BOKUM TOOL COMPANY

49 W. HANCOCK AVE., DETROIT, MICH.

★ welding economy **STARTS** with efficient handling of welding assemblies

★ Which means saving crane time, welders' time and helpers' time in getting better welds ("down-hand" at all points) faster.

C-F Welding Positioners in capacities from ½ to 7 tons, are production machines. Fasten your assemblies to the table and by hand or motor, under full control of the welder, the load can be tipped 135° or turned 360°. The table may be adjusted in height for handling very large assemblies.

C-F Welding Positioners make production welding cheaper, faster and better for many industries, as described in our Circular WP-20. You should have a copy. It will be sent without obligation, upon receipt of coupon.

Cullen-Friestedt Co.
Chicago, Illinois
Gentlemen: Please send me Circular WP-20.

Name_____

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CULLEN-FRIESTEDT CO.,

1813 SOUTHERN AVE. CHICAGO ILLINOIS

» » A.S.T.E. DOINGS « «

By IRWIN F. HOLLAND

Ford Lamb III

Ford R. Lamb, former President, and for the past four years Executive-Secretary of the A.S.T.E., has been seriously ill at Henry Ford Hospital in Detroit since early August.

Dayton

Dayton Chapter members enjoyed an excellent outing at Walnut Grove Country Club on August 13. The feature in the afternoon was a golf tournament which ended in a "jack pot" match on No. 1 for the real championship of the tournament. According to our observation, the match decided nothing, and if one can imagine eighteen men approach the green simultaneously, he can understand why.

Twenty prizes which were donated by members and their firms were awarded at the dinner by Ray Bleicher, Co-Chairman for the meeting. This was one of the finest dinners of the year so far, and the committee was duly commended.

Stanley Tatol was awarded first prize for low score having a 76 for eighteen holes. J. Petkewetz played for the first time and was awarded high score prize with 148. Other winners were too numerous to mention but one can't pass Bob Earhart who won the prize for low putts with 29.

Although there were several birdies and eagles reported, the outstanding shot of the afternoon was turned in by "Whitey" Poock, and according to eye witnesses was as phenomenal as any hole-in-one. "Whitey" played his usual style and was well off in the rough and some 75 or 100 yards from the green. Taking his trusty No. 5 and after tearing down part of the fence got a good swing at the ball and sent it sailing on to the green and into the cup.

The remainder of the evening was spent at cards and other indoor amusements; the poke championship was still undecided at the close of the meeting. Many courtesies were extended to the Chapter by the management and members of Walnut Grove which assured an enjoyable outing for all those attending.

▼ ▼ ▼

The Editorial Committee seem to have most of the space usually allotted to the Chapter Doings Column for their own use this month. This is due, no doubt, to the fact that vacation period is upon us and there have been no Chapter activities to report.

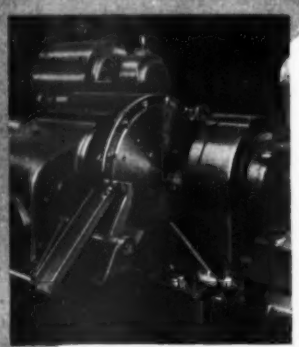
We know that most of the Chapter officers and Committee Chairmen have held their usual meetings and that in most Chapters the program for the next year is rounding into shape.

We should like to suggest to our readers that there will be many interesting talks presented during the coming season which should be written up and published as articles for the TOOL ENGINEER.

We also know that many of our members have interesting stories of applications that they have worked out in their own experience. These may consist of some unusual scheme of tooling which has worked out well or possibly the rebuilding of old equipment into a different type of equipment to meet the present emergency. These experiences would be of considerable assistance to other Tool Engineers if we can get them down on paper.

We should like to receive from our members stories of their experiences along these lines.

More aircraft nuts per day with this GARDNER Double GRINDER!

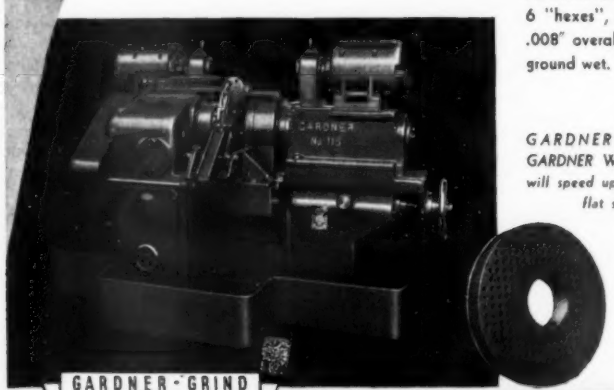


MILLIONS of steel nuts are being used in the aircraft industry today. To grind all six faces of these hexagon nuts is a real production problem, and a number of Gardner No. 115-15" Double Head Grinders like the one shown here, help turn out more thousands of nuts per day, on this important defense job.

This machine is provided with a rotary-type work carrier, with studs over which the nuts are loaded by hand. They are automatically indexed after each pass between the wheels, and are finally ejected automatically.

30 to 35 nuts per minute, complete on 6 faces.

PRODUCTION averages 30 TO 35 NUTS PER MINUTE, complete on all 6 "hexes", removing .006" to .008" overall stock. This job is ground wet.



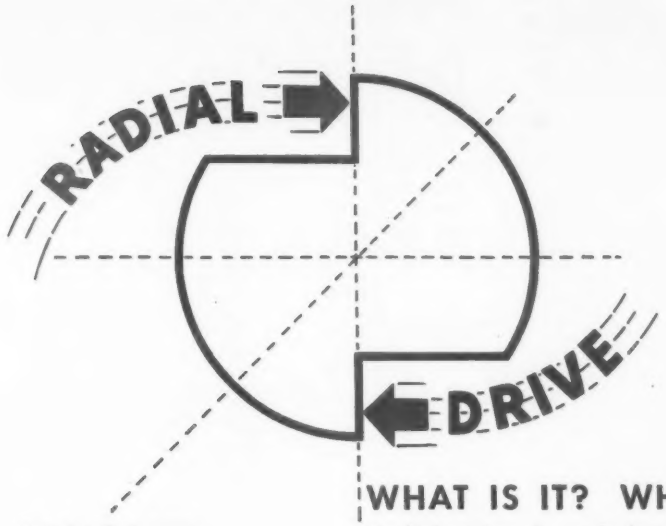
GARDNER GRINDERS and GARDNER WIRE-LOKT Abrasives will speed up production on YOUR flat surface jobs—

WRITE FOR OUR "MODERN METHODS" Booklet!

GARDNER-GRIND YOUR Flat SURFACES

GARDNER MACHINE COMPANY

442 East Gardner Street · · · · Beloit, Wisconsin, U.S.A.



Full details in your Eclipse catalog 35R

WHAT IS IT? WHAT DOES IT DO?

Radial Drive is a *balanced* driving mechanism for end-cutting tools—applying balanced energy on a line passing directly through center—not on a tangent! No wedging!

ECLIPSE COUNTERBORE COMPANY
DETROIT · MICHIGAN

NEW *Vernon* VERTICAL MILL and JIG BORER

THE ONLY MACHINE IN THE LOW PRICE FIELD on which Jig BORING Equipment can be furnished as a standard extra.

PROMPT DELIVERY

Equipped with *Dial Indicators* and *Measuring Rods*, the *Vernon* is invaluable for *smaller jig boring operations.*

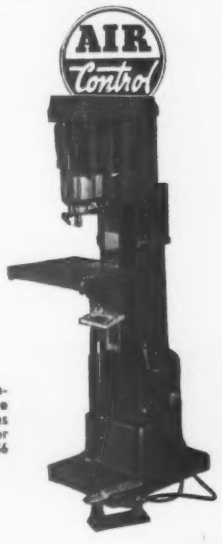
WRITE FOR FOLDER

MACHINERY MANUFACTURING COMPANY
1915 E. 51 St., Vernon, Los Angeles, California
Vernon Line of HORIZONTAL MILLS, VERTICAL MILLS, JIG BORERS, 11" SHAPERS & GRINDERS

Why Rob Peter to Pay Paul?

WHY sacrifice tapping **speed** for tapping ***accuracy*** — or vice versa? Haskins gives you ***both***—in **one** machine. Gives you Class 3 and 4 fit—***plus*** production increases. The Haskins Type C Tapper is even tapping to ***micrometer*** accuracy — and ***doubling*** production — for a leading manufacturer of micrometers!

We believe this ***air-controlled*** tapper can cut costs, decrease tap breakage and increase tapping production in your plant, too. Put us to the task of proving it!



FREE BOOKLET gives complete information about the Haskins Type C Tapper and the three capacities in which it is available. Write for it. R. G. Haskins Company, 2756 W. Flournoy St., Chicago.

HASKINS
R G HASKINS CO

The Passing Parade

Harry K. Clark, vice president and general manager of the Norton Co., Worcester, Mass., will join the staff of the Office of Production Management, the eighth Norton man to join the Federal government in defense work.

Mr. Clark will work with Joseph L. Overlook, assistant deputy director of the OPM priority division, spending several days a week in Washington and the remainder at the Norton plant.

Wallace T. Montague assistant vice president at Norton's has been named to succeed Mr. Clark on the board of the Grinding Wheel Manufacturers' Association, and Harry B. Lindsay, secretary of the association, has been appointed chairman of its defense committee.

Other Norton men serving as dollar-a-year defense men include Howard W. Dunbar, vice president and manager of the machine division and W. LaCoste Neilson, vice president.

Howard M. Hubbard, president and general manager of the Greenfield Tap & Die Corporation, Greenfield, Mass. has resigned, effective Aug. 31 to assume the presidency of the Elliott Company of Jeannette, Pa. manufacturers of turbo-electrical equipment. He has been succeeded by Donald G. Millar, chairman of the board and former Greenfield Tap & Die president.

Frederick E. Munschauer, Vice-President and Treasurer of Niagara Machine & Tool Works of Buffalo, has been elected President. He has been in the employ of the Company for a period of thirty-three years.

George R. Kinney, Sales Manager, who has served with the Company for twenty-two years, becomes Vice-President.

Niagara's Munschauer
Elected President

George Kinney
Moves up to vice-president.

James T. Fox has been made blast furnace superintendent for the Blast Furnace Division of Koppers United Company at Granite City, Ill., it is announced by John F. Byrne, general manager of the division.

Mr. Fox has been assistant blast furnace superintendent for the Interlake Iron Corp., South Chicago, Ill., for the past four years. Previous to that, he was associated with the Inland Steel Company.

How to *SPEED UP* production on jobs like these:

STRAIGHTENING HEAT TREATED SHAFTS

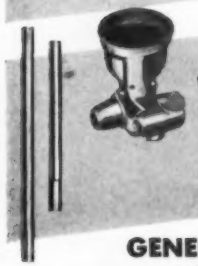
When this job was put on a 20-ton G-F-P Press the time was reduced to one fourth the time formerly required.

300% FASTER

STRAIGHTENING RING GEARS

Hourly production increased 50% when this job was put on a 20-ton G-F-P Press.

50% FASTER



PRESSING TUBES INTO HOUSINGS

Production on this operation was increased from 30 to 100 pieces per hour when put on an 8-ton G-F-P Press.

233% FASTER

Ask the nearest office for data on how G-F-P Presses will step up your production.

GENERAL MANUFACTURING COMPANY
6432 FARNSWORTH AVE., DETROIT, MICHIGAN

Chicago—John Morley Davie—4125 Belle Plaine Ave. • Cincinnati—George H. Diers—4807 Yarmouth Place • Cleveland—The Cleveland Duplex Machinery Co., Inc., Penton Bldg. • Detroit—McKee-Kenyon & Co.—1627 W. Fort St. • New York—Triplex Machine Tool Corp.—125 Barclay St.

GENERAL *Flexible* POWER PRESS

GAMMONS
OF
Manchester

PRODUCTION TOOLS

ORIGINATORS AND
MANUFACTURERS OF HELICAL
FLUTED TAPER PIN REAMERS

THE GAMMONS-HOAGLUND CO., MANCHESTER, CONN.

ON THE NOSE!

Since Taft-Peirce first provided the gages for the original educational shell orders, the capacity of the Taft-Peirce Gage Division has doubled, redoubled, and still continues to grow Today, throughout the defense industries, costly errors are being avoided, precious time is being saved, accurate size-control of production is being maintained with Taft-Peirce Gages and Gaging Fixtures. One of the few complete gaging systems, the Taft-Peirce line includes all standard types. Any special types may be produced as ordered. For the full picture, write on your letterhead for a copy of the 1941 Taft-Peirce Handbook.

The Taft-Peirce Mfg. Co., Woonsocket, R. I.

76% SAVED

—USING CAMPBELL *Cutamatics* TO CUT TUBING FOR 75mm. SHELLS IN 40 SECONDS

On this job one CAMPBELL CUTAMATIC set-up and 40-second operation replaced three operations: Cutting, 1 minute, 36 seconds; Burring, 22 seconds; Machining, 55 seconds.

That shows the direct labor, handling time and usable floor space that can be saved by analyzing methods used to cut solid bars or tubing with CAMPBELL CUTAMATICS.

CAMPBELL *Cutamatics*

Among Defense work cut on CAMPBELL ABRASIVE CUTTING MACHINES: **Aircraft:** Crankshafts, valve stock, valve tappet guide, pistons. **Tanks:** Crankshafts, springs. **Miscellaneous:** Gun barrel and machine gun stocks; armor plate (tests), forging blanks.

Cut on CAMPBELL NIBBLERS: Sheet stocks, tubing, gas and oil tanks for **Aircraft**—motor truck bodies, armored truck bodies, etc. for the **Army.**

WRITE FOR A COPY OF THIS BOOKLET IT MAY HELP YOU

ANDREW C. CAMPBELL DIVISION
BRIDGEPORT, CONNECTICUT

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.

TO MEET
THE NEEDS of NATIONAL
DEFENSE

OSTER

Makes
PIPE and BOLT
Threaders

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HAND SCREW
Machines

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a TOOL or MACHINE
for PRACTICALLY
Every
REQUIREMENT

Write FOR NEW 1941 CATALOG
or TELL US YOUR PROBLEM and
WE'LL GLADLY DISCUSS THEM
WITH YOU

The
OSTER
Manufacturing
COMPANY
2063 E. 61st Street
Cleveland, Ohio

—PASSING PARADE—

Lyon Iron Works of Greene, N. Y. manufacturers of Material Handling Equipment, which was established in 1840, has changed its name to Lyon-Raymond Corporation.

The change relates to name only, as the company will continue under the same management as in the past, directed by George G. Raymond, who has been President for the last 19 years.

The business was founded in 1840 by George R. Lyon and was conducted under the management of three successive generations of the Lyon family. The executive heads, in addition to the founder, were Henry A. Lyon and Walter L. Lyon.

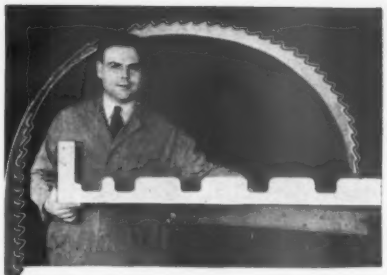
In 1922 Walter L. Lyon's interest was taken over by George G. Raymond. New lines of products were developed and old lines gradually discontinued, until today the company has a well rounded line of material handling equipment including hydraulic lift trucks, hydraulic elevating tables, and other hydraulic equipment. Employment is tripled over the figure of this time last year and is at the highest point in the company's history.

Lyon's Raymond George did it.

Recently promoted from territorial sales work to a position as special representative of the Plomb Tool Company, Glenn Crandall is making a field survey trip by air to cover all principal cities in the country.

The survey is expected to take approximately six weeks and is for the purpose of studying marketing conditions in the various territories to facilitate improved service for Plomb Tool jobbers and users.

M. J. Tennes, Jr., President, Shafer Bearing Corporation, effective July 5th has entered active service as Captain in the United States Army Air Corps with permanent station at the Air Corps Advanced Flying School, Phoenix, Ariz.



DoAll SAWS

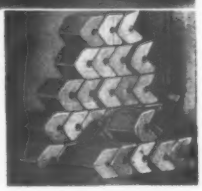
SPEED — and then some!

DoAll Band Saws are the finest made—developed to meet today's exacting demands in cutting metals, alloys, plastics—cold rolled nickel, steel, cast iron, zinc, copper, brass, bronze aluminum alloy, laminated low carbon steel sheets, neoprene, slate, etc.

Above is a 7/8" thick template of rolled steel sheeting cut in 35 minutes on the DoAll.

Typewriter covers notched out in 5 minutes each. Formerly took 30 minutes to drill and file.

32 dies exactly alike, 1¾" thick, of oil hardening tool steel, sawed in 23½ hours.



Parts for dies made at C. A. Weidner & Sons, Rochester, N. Y.

SAVE TIME AND MONEY

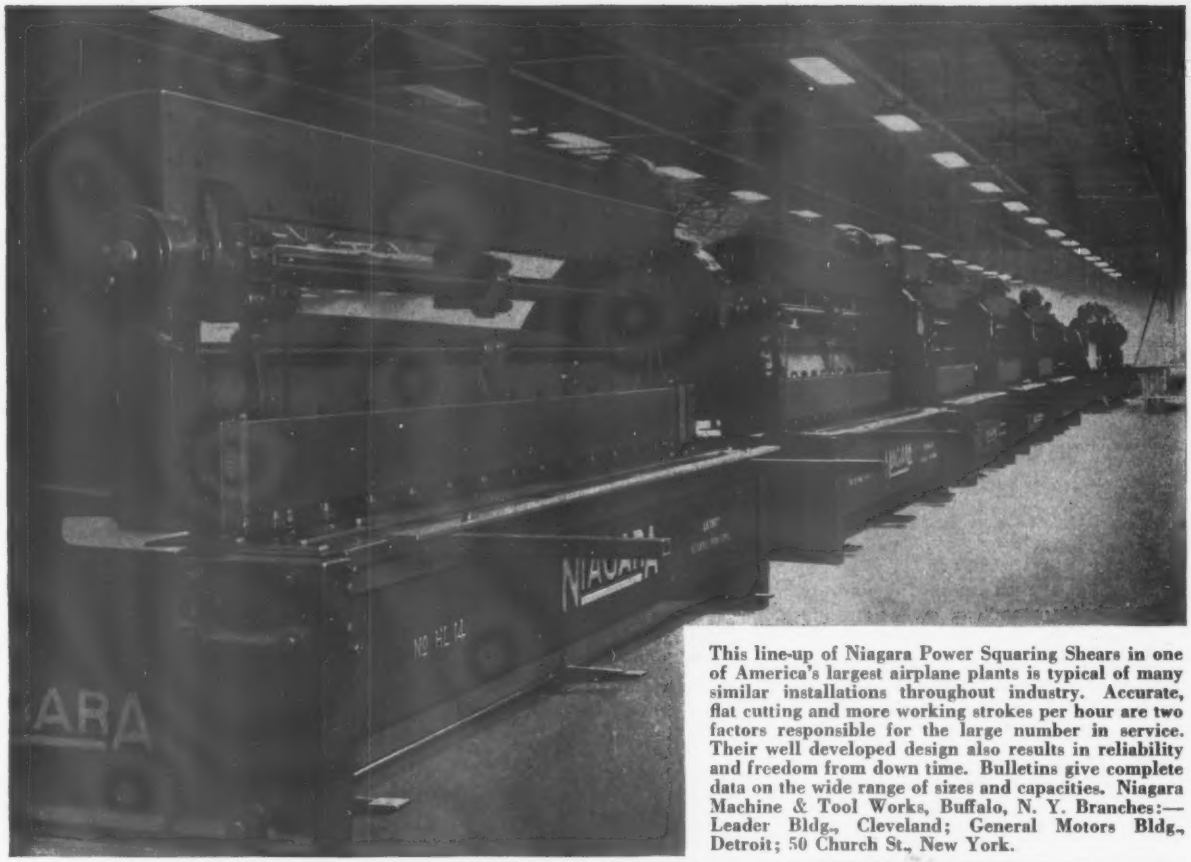
DoAll Band Saws have been developed by today's best metal engineers, to last longer, to run more work per saw, and to do smoother, speedier work. DoAll Saws are available in every size, Raker tooth, heavy set, A temper, approved by the Office of Production Management on August 20th. Ask for list.

EASY TO HANDLE

Available in various lengths. Each comes in a metal box, with a slot for saw to be pulled out and cut off as required.

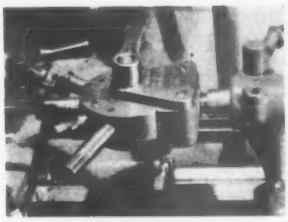
SEND FOR BOOKLET — *Actual Performance Records of DoAll Saws*

THE DOALL COMPANY, INC.
1211 Thacker St. Des Plaines, Ill.
Associated with Continental Machines, Inc., Minneapolis, Minn.

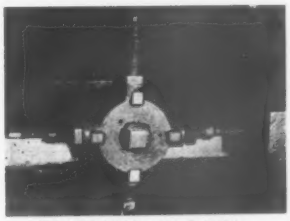


This line-up of Niagara Power Squaring Shears in one of America's largest airplane plants is typical of many similar installations throughout industry. Accurate, flat cutting and more working strokes per hour are two factors responsible for the large number in service. Their well developed design also results in reliability and freedom from down time. Bulletins give complete data on the wide range of sizes and capacities. Niagara Machine & Tool Works, Buffalo, N. Y. Branches:—Leader Bldg., Cleveland; General Motors Bldg., Detroit; 50 Church St., New York.

REDUCTION IN PRICES
of
QUADRUPLEXES



QUADRUPLEX TURRET TAILSTOCK
$15.00 F.O.B. BLOOMFIELD, N. J.



QUADRUPLEX LATHE STOP
$15.00 F.O.B. BLOOMFIELD, N. J.

NOW, you can eliminate production bottlenecks at minimum cost. Your present equipment, fitted with QUADRUPLEX turret tailstocks and lathe stops is immediately capable of multiple machining operations. A mere flip of the lever permits the start of a new operation in a fraction of the time which it normally takes to change tools and readjust distances.

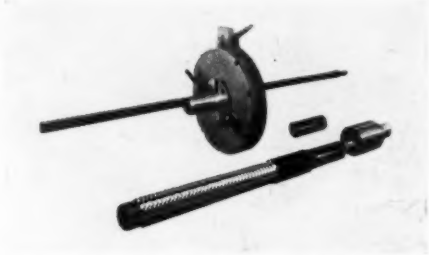
SAVES TIME, SAVES DOLLARS, SPEEDS PRODUCTION

IMMEDIATE DELIVERY FROM STOCK

WRITE TODAY FOR DETAILS

SPECIALTIES MANUFACTURING COMPANY, Inc.
35 Farrand Street **Bloomfield, N. J.**

Economical Broaching of LARGE SPLINE HOLES



Shown above is equipment furnished one of our customers for the economical broaching of large spline holes. The splines are first rough broached by indexing the fixture shown and pulling the cutter bar through, roughing out each individual spline. The splines are then finished in one pass by pulling the multi-spline broach thru the part. The above equipment was furnished by AMERICAN for use on customers broaching machine.

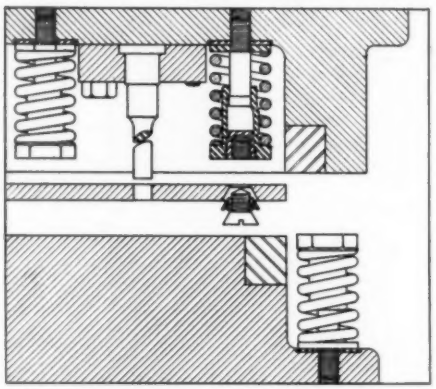
AMERICAN BROACH & MACHINE CO.

ANN ARBOR, MICHIGAN, U.S.A.

STANDARDIZE on the new WALES

STRIPPITS

Self-contained spring stripper units.



1. Stripper plates may be removed with die in press.
2. No stripper plates required for stripping scrap.

These units offer many opportunities for saving in Die design; Die making; Die operation; and Die servicing.

Write for catalog.

THE STRIPPIT CORPORATION

BUFFALO, N. Y.

——PASSING PARADE——

In addition to active military service by the president of the Shafer Bearing Corporation, the company is also exceedingly active in the industrial phase of the national defense effort. The company is supplying large quantities of bearings to practically all important aircraft manufacturers such as Douglas, Martin, Boeing, North American, Lockheed, Curtiss-Wright, etc. and to such vital defense production industries as steel mills, machine tool builders, shipbuilders, tank builders, etc. During the absence of Captain Tennes, the management of the Shafer Bearing Corporation will be under the direction of John F. Ditzell, Vice President and General Manager.

A district sales engineering office at 50 Church Street, New York, was opened July 10 by Vascoloy-Ramet Corporation, North Chicago, Illinois, manufacturers of tantalum-tungsten carbide tools, blanks, dies and wear resisting parts. Sales and service for the New York area had been handled previously from the Vascoloy-Ramet eastern plant in Jersey City.

In charge of the New York Office is Eugene Roth, eastern district sales manager, assisted by Alan Carver, Harry J. Chase and Standish Rowe.

Other factory-owned Vascoloy-Ramet branches are at Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Hartford, Milwaukee, Philadelphia, Pittsburgh, Providence, St. Louis and Syracuse.

Mr. W. W. Gilbert, formerly Advertising Manager of all Divisions, will be made General Office Manager of the Fittings Division of The Watson-Stillman Co., Roselle, N. J. effective August 1st. On this date the entire Advertising Department activities will be taken over by the Advertising Agency, O. S. Tyson and Company, Inc., 230 Park Avenue, New York, N. Y.

Edward M. Kimball has been appointed New England representative for McKenna Metals Company, Latrobe, Pa., according to a recent announcement by J. Arthur Deakin, Eastern Sales Manager. His headquarters will be at 50 Church St., New York City, the Eastern Sales Office.

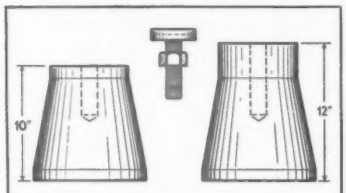
Mr. Kimball, who has had a great deal of practical experience in the carbide business, will sell and service Kennametal steel-cutting carbide tools and blanks.

David J. Ross, President, has announced the appointment of Oral B. Wright as Director of Sales and Advertising for the David J. Ross Company, Benton Harbor, Michigan, manufacturer of Punch Presses and production equipment.

Wright brings with him a wide ex-

FOR *Laying-Out and Inspection*
OF JIGS, FIXTURES, ETC.

South Bend
CAST IRON
SURFACE PLATES



ADJUSTABLE BLOCKS
Five blocks, either size, furnished with each plate for firm yet adjustable support. (1½ inch adjustment.) Fine thread for "vernier" adjustment.

Write Now!
Ask the price—and approximate shipping date—of this useful and convenient item. Also inquire about your tooling problems in general. We offer a complete tool, jig, fixture and die service.

Formerly made only for our own use, now available for manufacturers, machine shops and large tool rooms. Made with "professional" skill by *master toolmakers,* finished to best toolroom practice. Choice of *seven* support points provides flexibility of use for all shop needs. *Five* legs or blocks furnished with each plate. South Bend Tool & Die Company, 2209 South Main Street, South Bend, Indiana.

SOUTH BEND TOOL & DIE CO.

for Defense!

DESPATCH "CF" FURNACES

ACCURATE
•
UNIFORM
•
SPEEDY
•

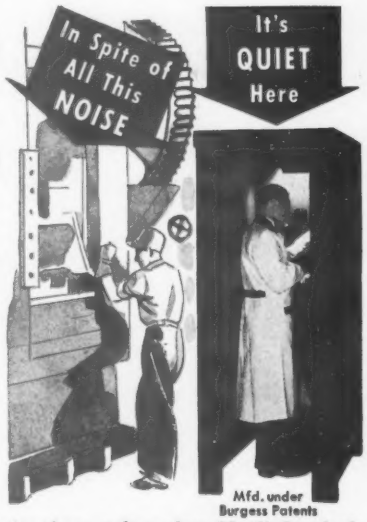
Prompt Deliveries Maintained!

The Despatch "CF" Furnaces are increasing production by eliminating heat treating bottlenecks in defense plants everywhere. They are absolutely reliable for the tool room, production line and metallurgical laboratory. Available in 12 standard sizes.

WRITE TODAY FOR NEW BULLETIN No. 83T containing details and prices on gas or electricity heated Despatch "CF" Furnaces.

DESPATCH
OVEN COMPANY · Minneapolis, Minnesota

This Acousti-Booth Makes Telephoning Easy in NOISY PLACES



No matter how noisy your shop may be, you can telephone in comfort in a Burgess Acousti-Booth. The patented, sound absorbent walls of this handy booth soak up factory noise and give you a "zone of quiet" for easy telephoning. It has no doors because no doors are needed.

There are no mechanical parts—hence no maintenance is required. Open bottom makes the booth easy to keep clean. Used in hundreds of plants with complete satisfaction. Send coupon for full details.

Mfd. under Burgess Patents

Mail Coupon for Free Booklet

Burgess Battery Co., Acoustic Div., 558 W. Huron St., Chicago
Please send illustrated catalog describing the Burgess Doorless Acousti-Booth and how it works.

Name .....
Firm Name .....
Street-City .....

BURGESS ACOUSTI-BOOTH

RUTHMAN
GUSHER
COOLANT PUMPS

Save and ***profit!*** No packing to leak, consume power or require adjustment. Less power is consumed when throttled. Full ball bearing design minimizes friction. There's a Gusher model, from 1/30 to 2 H. P., to speed your jobs.

P-3 is available in external right or left discharge models, flange - mounted and immersed models.

Pats. and Pats. Pend.

Model P-3

Write for engineering data and specifications.

THE RUTHMAN MACHINERY CO.
1815 READING ROAD, CINCINNATI, OHIO
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

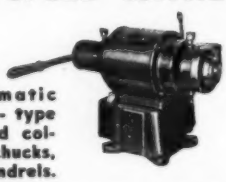
SCHAUER
Speed Lathes

For speedier, more economical finishing of small metal and plastic parts...

Finishing • *Polishing*
Lapping • *Burring*

• IDEAL SPEED LATHE

Equipped with single or 2-speed motor; exclusive, automatic brake; spring - type hand - operated collet, or step chucks, expanded mandrels.



• VARIABLE SPEED LATHE

with infinite selection of spindle speeds, between 65 and 5,000 R.P.M. (ratio of 6 to 1 with single speed and 13 to 1 with 2-speed motor.)

•

• We design special lathes to meet individual production requirements.

WRITE FOR BULLETIN No. 400

SCHAUER MACHINE CO.
2066-68 Reading Rd., Cincinnati, O.

perience in the machinery and automotive sales fields, having served with Dodge Motor Company in 1914 when the first Dodge automobile was produced, and for a number of years following.

After his work in production, sales and dealer organization with Dodge, Mr. Wright became Sales Consultant for other manufacturers, assisting in the establishment of new distributors and dealers as well as in sales-promotion and sales training activities. Wright recently completed an assignment for the Progressive Welder Company of Detroit, Michigan, and has already assumed his new position in charge of sales and advertising for the Benton Harbor concern.

A. T. Carter of 36 Richmond St., Rochester, N. Y., has been appointed representative in upper New York state for Keystone motor, and generator brushes and Keystone negative temperature coefficient resistors, by the Keystone Carbon Co., St. Marys, Pa.

AUSTERBERRY'S HANDLE CONE

The Cone Automatic Machinery Company is represented in Detroit by J. C. Austerberry's Sons. The offices being opened by Hollis U. Gordon and Chester L. Glover, reported in the last issue, will be located in Chicago. They will represent the National Broach and Machine Company and the Cone Automatic Machinery Company.

The Fellows-Gear Shaper Co., Springfield, Vermont have recently opened a new cafeteria for the benefit of employees and particularly those who reside out of town. This cafeteria is located on the top floor of a new storage building of fireproof construction which has recently been completed. The cafeteria has a seating capacity of 200 at one time and will serve four meals per day—Breakfast—5:30 to 6:30 — Noon dinner—12:00 to 1:00 p.m.—Supper—5:00 to 6:30 p.m. — Midnight Dinner —12:00 to 1:00 a.m.

Mr. M. K. McGrath, President of the Kellogg Switchboard and Supply Company, Chicago, announced that F. G. Gardner of the engineering staff has been selected to fill the position of acting Chief Engineer. This appointment places a veteran of 40 years experience in the electrical communications industry at the head of the engineering department and research laboratory of one of the oldest and largest Independent telephone equipment manufacturers. Mr. George R. Eaton, Vice President in charge of Engineering, is taking a leave

U S
HEADS
STANDARD SINCE
1915

30 DIFFERENT STANDARD SIZE ADJUSTABLE DRILL HEADS, CAPACITIES UP TO 1½" DRILLS

SEND US YOUR B/PS

All Types of Fixed Center Heads

UNITED STATES DRILL HEAD CO.
Cincinnati, Ohio

T. H. L. FRONT LEVER
BENCH PUNCH

Built for hard tough work — die cannot lose alignment with punch — all parts interchangeable.

Capacity ½" holes through $\frac{3}{16}$" steel; $\frac{13}{32}$" through ¼" steel. Can also be made for holes up to ⅞" in thinner metal. Stock punches and dies available from $\frac{1}{16}$" to ½" by 64ths.

PRICE WITH ONE PUNCH AND ONE DIE—

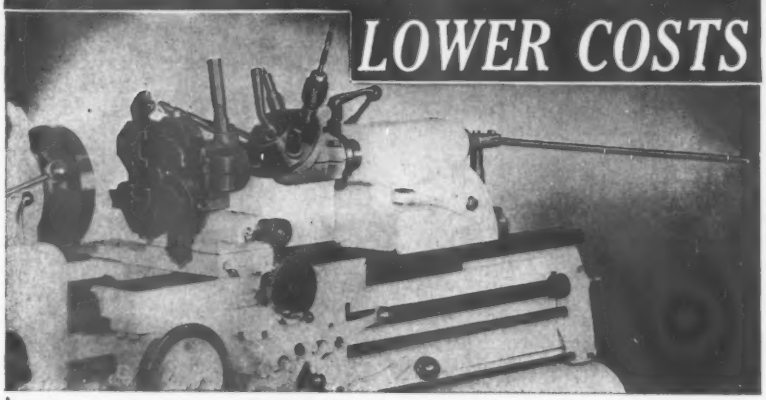
$50.00

Immediate Shipment

Weight, 70 lbs.

T. H. LEWTHWAITE MACHINE CO.
(Est. 1890)
307 E. 47 St. NEW YORK

SPEED-UP PRODUCTION— LOWER COSTS



CONVERT ENGINE LATHES

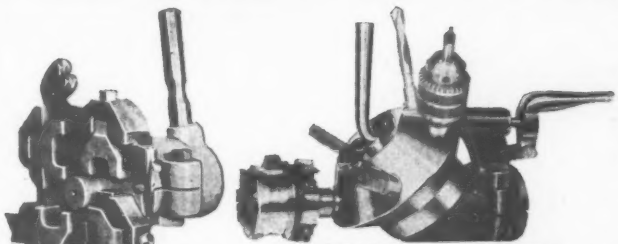
Here's a quick and economical method of converting your engine lathes into complete, accurate turret lathes—by installing the Jefferson Tail Stock Turrets, the Jefferson Tool Post Turrets and the Jefferson Adjustable Pull-Feeds.

These sturdy, precision attachments have in many cases made it possible to double productive capacity — because nine different tools are quickly available at all times — independently or collectively.

Any kind of work may be done quickly and efficiently — forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping lathe or changing tools.

Jefferson Turrets are real production tools—substantial, rigid, accurate and adaptable to any size or make of engine lathes. They must not be confused with the small makeshift gadgets now on the market.

We also manufacture Belt Sanders, Swing Frame Grinders, Gyratory Foundry Riddles and Milling Machines. Let us mail bulletins giving full details.



4 Tool—Tool Post Turret

5 Tool—Tail Stock Turret

JEFFERSON MACHINE TOOL CO.
Sweeney, Cutter and Fourth Sts. Cincinnati, Ohio

TAKE ADVANTAGE OF THESE SERVICES!

Use the Business Reply Cards on Page 81:

1. To order New Literature
2. To request further information on New Equipment
3. To inquire about any product advertised in this issue.

THE TOOL ENGINEER

EVANS HIGH SPEED STEEL REAMERS

WILL SHIP ON 30 DAYS' TRIAL

LOOK AT THESE FEATURES

- No honing.
- Will not chatter.
- Chrome-like finish.
- Perfect alignment.
- Full bearing surface.
- Left and right spirals.
- 50 to 80 thousandths expansion.
- Cannot fall in slots or oil grooves.
- Extension pilots for line-up work.

WRITE FOR CIRCULAR

EVANS FLEXIBLE REAMER CORPORATION
4539 Ravenswood Ave., Chicago, Ill.

Serving the aircraft, automotive, machine, and manufacturing industries for the past 23 years. Unusual diversified experience and a trained organization offering a real service to companies with engineering, tooling and production problems.

Specialists in the design of special machinery, dies, tools, jigs and fixtures.

We invite inquiries and will be glad to have a representative call upon request.

MACHINE & TOOL DESIGNING CO.
1011 CHESTNUT STREET PHILADELPHIA, PA.

Pittsburgh Representative:

Robert A. Cummings, Jr., 239 Fourth Avenue, Pittsburgh, Pa.

TO HELP YOU TEACH THE NEW GRINDER HAND

how to get maximum service from your Diamond Tools—we have some effective training material. Send for it. No obligation.

KOEBEL DIAMOND TOOL CO.
9348 Grinnell Ave., Detroit

KOEBELITE
DIAMOND TOOLS

Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for All Industrial Purposes.

DANLY Knurled

SOCKET-HEAD CAP SCREWS

HOLLOW SET SCREWS

All Die Makers' Supplies
Danly Commercial Sets
Danly Special Sets

DANLY SERVICE
Nine Danly Branch Stocks Provide 24-Hour Service for 95% of All Metal Fabricating Plants.

Danly Machine Specialties, Inc.
2100 South 52nd Avenue, Chicago

MILWAUKEE • LONG ISLAND CITY, N. Y. DAYTON • DETROIT • ROCHESTER • CLEVELAND • PHILADELPHIA • DUCOMMUN METALS & SUPPLY CO., LOS ANGELES; SAN FRANCISCO.

Danly

PRECISION die sets

——PASSING PARADE——

of absence at the advice of his physician because of ill health.

As a member of the Kellogg staff, Mr. Gardner has been engaged in special transmission engineering work, and his background before coming to Kellogg included extensive experience in both the telephone and telegraph communication fields.

Mr. H. H. Seaman, President of the Seaman Body Co. has been appointed Deputy Coordinator for Wisconsin, and Clifford E. Ives, President of Ives Engineering Laboratories, was named Deputy Manager of the branch office.

The function of the Defense Contract Service is to speed production of Defense materials and to act as a liaison office to assist manufacturers in obtaining Government Contracts and sub-contracts.

Clifford Ives
Deputy Manager
DCS is a liason office.

Mr. Ives has been actively engaged in A.S.T.E. work and is at present serving on the National Standards Committee of the A.S.T.E.

Died

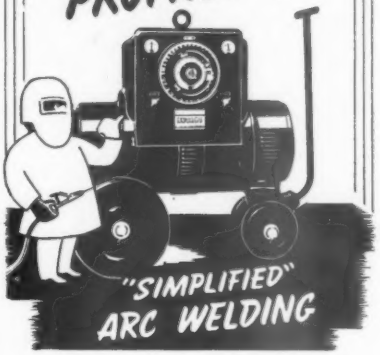
E. Kent Hubbard, 72, president of the Connecticut Manufacturers Association since 1918 and former president of the Maxim Silencer Company of Hartford, died on his estate in Middletown after a short illness.

A native of Chicago, he was a director of nearly a dozen banks, utilities and industrial concerns. Before his term as president of the Maxim Company from 1913 to 1916, he was treasurer of the Russell Manufacturing Company of Middletown.

M. J. Tennes, Sr., Chairman, Board of Directors, of the Shafer Bearing Corporation died at his home in Chicago.

Mr. Tennes is survived by his widow, Ida B. Tennes; his daughter, Dorothy Tennes; and three sons, Captain Monte J. Tennes, Jr., President of the Shafer

SAVE TIME... INCREASE PROFITS with...



"SIMPLIFIED" ARC WELDING

● Delays are unnecessary when Hobart Arc Welders are on the job . . . they're ruggedly built to withstand hours and hours of continuous welding. Production speeds up; profits increase. Exclusive Hobart features cut labor costs and guarantee highest quality welds. Ease of operation and lower current costs make Hobart your logical arc welder buy. Write for details.

★This Valuable Book FREE... Tells how to apply arc welding to hundreds of new jobs. Write for it.

Hobart Bros. BOX. TE. 91 TROY, OHIO
one of the world's Largest Builders of Arc welders

GARRISON GEAR CHUCKS

are used on—

- GEAR SHAPERS
- DRILL PRESSES
- ENGINE LATHES
- TURRET LATHES
- INTERNAL GRINDERS
- EXTERNAL GRINDERS
- OSCILLATING GRINDERS
- DIAMOND BORING MACHINES
- HORIZONTAL BORING MILLS

and are used for—

Grinding . . . Precision Boring . . . Machining and other operations on Spur . . . Internal . . . Bevel . . . Cluster . . . Helical and Herringbone Gears.

GARRISON
MACHINE WORKS, INC.
DAYTON OHIO

To those who believe that the best is none too good.

We offer workmanship which is not excelled, and a range of work which is not equalled by anyone else in this business.

NATIONAL TOOL SALVAGE CO.
3816 Beaubien St.
Detroit, Mich.

IMMEDIATE DELIVERY

AUTOMATICS
No. 00 & 19 Brown & Sharpe
Cleveland, 4½" Model M, Chucker, M.D.
1¼" Gridley 4-spindle Model F., SPD.
2¼ & 3¼" Gridley single spindle
No. 22 New Britain

DRILLS
No. 1A Edlund H.S.B.B., 4 Spdl., Power Feed, M.D.
Assorted High Speed & Sliding Head
3½' Fosdick Radial, SPD.

GRINDERS
6" x 32"; 10 x 18 & 24, Norton Plain
6" x 20" Fitchburg, Plain
10" x 24" Landis, Self Contained
16" x 66" Landis Plain

LATHES
Hendey Yoke Head, 12 x 5, 14 x 5 and 18 x 10'
24" x 10' Schumacher-Boye, Quick Change, C/S

MILLING MACHINES
No. 3 & C.S. Becker Vertical
LeBlond No. 2 Plain, Cone

PRESSES
No. 74 & 75 Toledo Open Back
No. 2, 3, 4 & 5 PG Farracute Solid Back
No. 1 to 7A Niagara, O.B.I.
No. 152D Cleveland, Dble. Crank 30 x 75" Bed, Tie Rod, Sgle. Geared, 4" shaft, 4" stroke, M.D.

MACHINE TOOLS — POWER PRESSES
OTT MACHINERY SALES INC.
546 Second Ave. — Detroit, Mich.

——PASSING PARADE——

Corporation, now on active duty in the United States Army Air Corps; Ray P. Tennes, Secretary-Treasurer and Director of the Shafer Corporation; and Ensign Horace E. Tennes, also a Director of the Shafer Corporation, now on active duty in the United States Navy Air Corps.

Mr. Tennes, Sr., who has served as Chairman of the Board of Directors of the Shafer Corporation since 1934, has a host of friends in the bearing industry. His charming personality and pleasant good fellowship shall long be remembered by those who have been privileged to know him.

August W. Sidell, retired demonstrator for Gisholt Machine Company, Madison, Wisconsin, died June 30th at the age of 76. He was one of the earliest members of Gisholt's field organization, having served as a demonstrator for several years before being sent to Europe in 1904. At the beginning of the war, ten years later, he returned to this country, continuing as one of the most expert and diplomatic members of Gisholt's demonstrator staff. His great interest in his life-long work was exemplified by his temporary return from retirement to serve as a demonstrator at the Machine Tool Show in Cleveland in 1935.

Stephen W. Dimick, Vice President of the Colt's Patent Fire Arms Manufacturing Company died suddenly at his home in West Hartford, Conn. Mr. Dimick formerly was with the Winchester Repeating Arms Company and joined the Colt's Company in 1923, as sales manager, becoming vice president in 1935. During his service with the company he had charge of Western sales with headquarters in Chicago and later was vice president in charge of the small arms division. He was widely known among sportsmen and handgun shooters in all parts of the country.

Dwight C. Wheeler, 57, president, treasurer and general manager of the Acme Shear Company, Bridgeport, Conn. died at his home in Easton. Mr. Wheeler began work with the Acme Shear Company as a boy and had been its head for several years. He also was a director of the First National Bank and Trust Company of Bridgeport and a member of the Bridgeport Park Board and the Connecticut Prison Board.

Walter D. Wallace, 65, assistant secretary of Clark Brothers Bolt Company, Southhampton, Conn. died at his home Aug. 16.

Louis H. Mesker, for the past ten years Cleveland representative for Reed-Prentice Corporation, died August 1, 1941 at the age of 65. He was formerly connected with Cleveland Planer and Kearney-Trecker.

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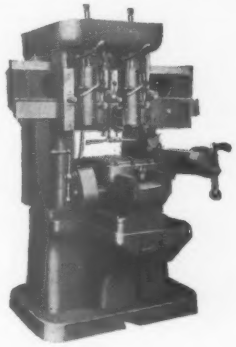

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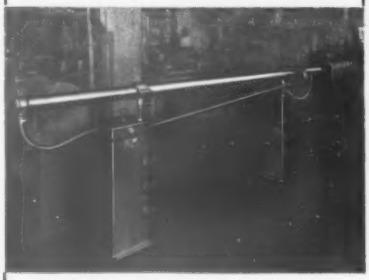

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SEPTEMBER MEETINGS

BALTIMORE—Sept. 3. 8:30 P.M. Sears & Roebuck Auditorium, Hartford and North Avenues. J. D. Trethaway, Manager of Alloy Sales, of the Cerro De Pasco Copper Corporation will talk on the "Application of Bismuth Alloy For Industrial Purposes." Reservations: L. MacGregor, 501 Hollen Road, Baltimore.

BOSTON—Sept. 11. Dinner 6:30 P.M. Technical Session Room 6-120 at 8:00 P.M. Walker Memorial Building, Massachusetts Institute of Technology. Frank W. Curtis, President of the A.S.T.E. and Chief Engineer for Van Norman Machine Co., will speak on the subject of "Jigs and Fixtures."

BUFFALO—Sept. 18. 6:30 P.M. University Club. Speakers and subject will be announced later. On Sept. 6, 12:30 P.M. rain or shine, the fifth annual picnic will be held at Trap and Field Club. There will be good food, drinks, contests, prizes, music and fun for everyone attending.

ROCKFORD—Sept. 11. Dinner 6:30 P.M. $1.00. Hotel Faust, Rockford. The speaker will be Frank W. Curtis, President of the A.S.T.E. Reservations: Allis-Chalmers, Main 6270, by Sept. 9.

ST. LOUIS—Sept. 11 will be the first meeting following the summer recess.

SYRACUSE—Sept. 8. Dinner 6:30 P.M. Technical Session 8:00 P.M. Onondaga Hotel. Speakers will be announced later. Reservations: Ray Coseo at Crouse Hinds Co. 2-1111. On Sept. 6th at Hinderwadel's Grove a Clambake will take place. Lunch will be served from noon till 3:00 P.M. Dinner will be served at 4:00 P.M. There will be games, sports, prizes and food. Reservations: W. A. Parish, at Crouse-Hinds Company.

TRI-CITIES—Sept. 10. 6:30 P.M. Swedish Olive Singers' Home, On Rock River south of Moline, Illinois. Frank W. Curtis, President of the A.S.T.E. will be the guest speaker. Reservations: L. I. Rodgers, Deere & Mansur Works, Moline, Illinois.

TWIN CITIES—Sept. 10. 6:30 P.M. Dunwoody Industrial Institute. H. E. Linsley of the Wright Aeronautical Corp., will show a sound film of the manufacturing operations on the Wright 14 cylinder "Cyclone" Engine.

WORCESTER—Sept. 15. 6:30 P.M. Putnam & Thurston's Restaurant. The speaker will be A. H. d'Arcambal and his subject will be "Machinability of Metals".

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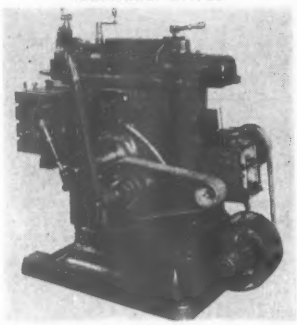

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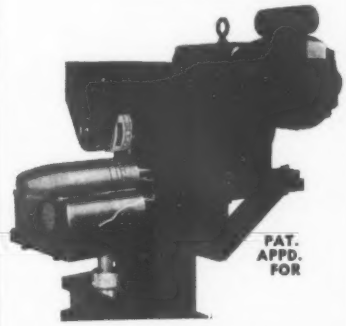

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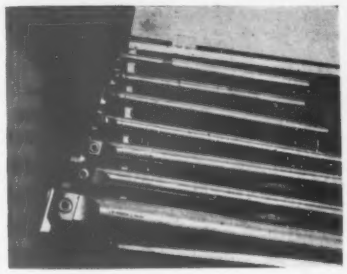

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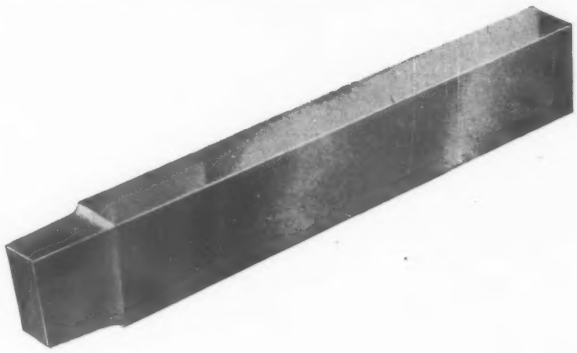

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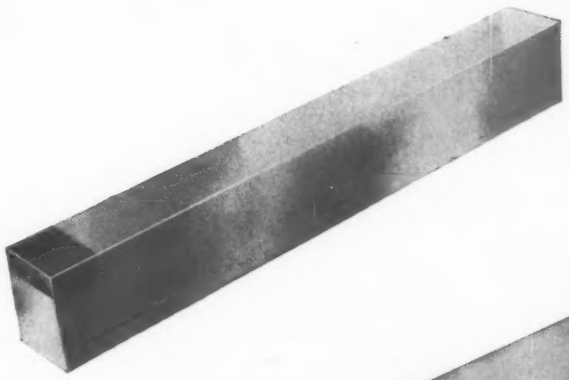
R-100	L-100	1/4 x 1/4 x 2
R-101	L-102	5/16 x 5/16 x 2 1/4
R-103	L-104	3/8 x 3/8 x 2 1/2
R-105	L-106	7/16 x 7/16 x 3
R-107	L-108	1/2 x 1/2 x 3 1/2



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Tool No.	Shank Size
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301	5/16 x 5/16 x 2 1/2
302	3/8 x 3/8 x 2 1/2
303	1/2 x 1/2 x 3 1/2

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200	1/4 x 1/4 x 2
201	5/16 x 5/16 x 2 1/4
202	3/8 x 3/8 x 2 1/2
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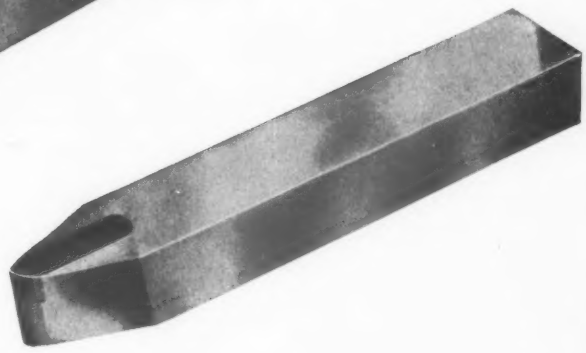

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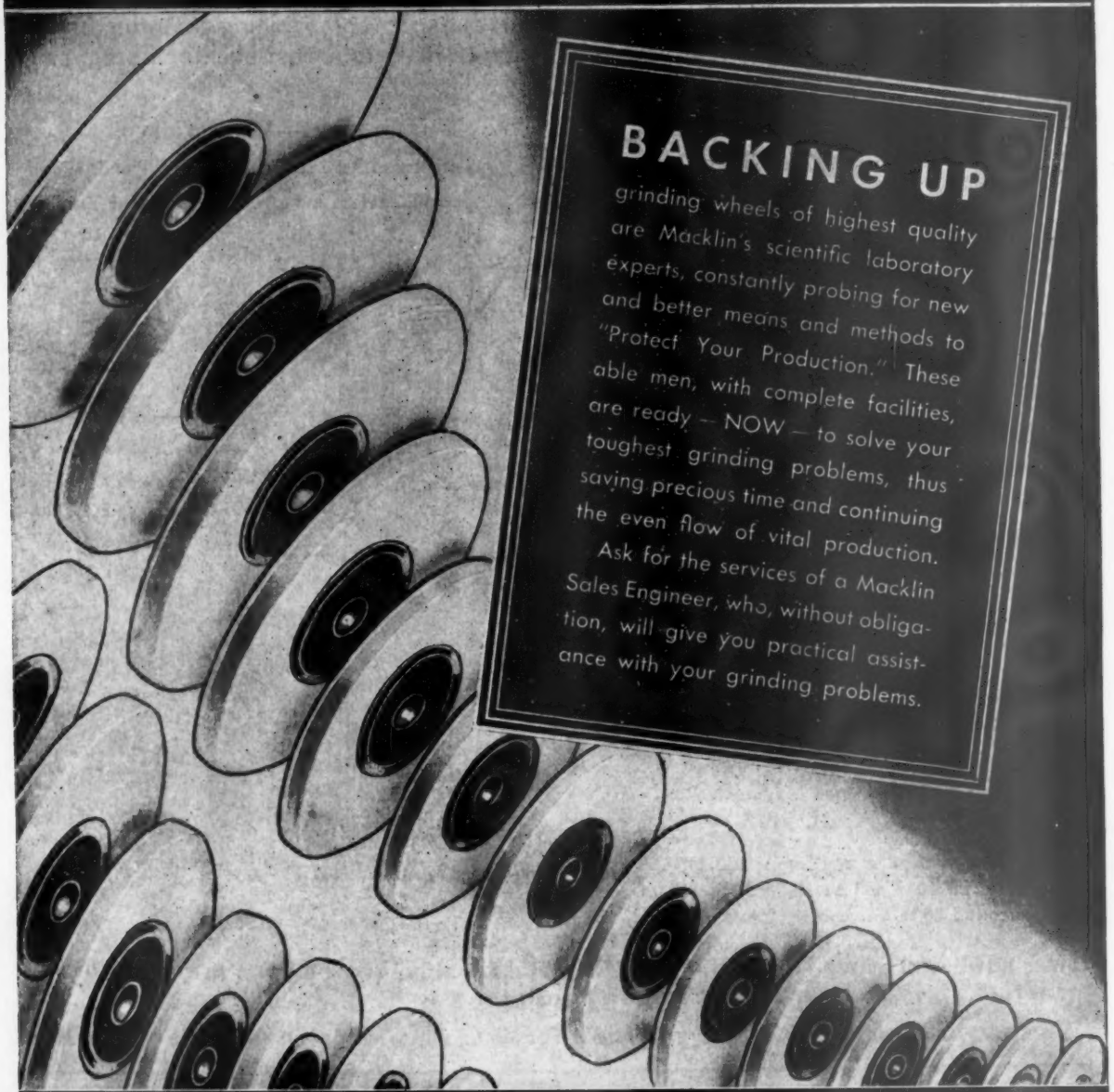

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